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U.S. Department of Energy
Idaho Operations Office

Remedial Design/Remedial Action Work Plan for the VES-SFE-20 Hot Waste Tank System

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Prepared for the
U.S. Department of Energy
Idaho Operations Office

ABSTRACT

This Remedial Design/Remedial Action Work Plan provides the framework for defining the remedial design requirements, preparing the design documentation, and defining and implementing the retrieval phases of the Waste Area Group 3, Group 7, VES-SFE-20 Hot Waste Tank System and ancillary components located at the Idaho Nuclear Technology and Engineering Center at the Idaho National Engineering and Environmental Laboratory. This plan details the design developed to support the remediation and disposal activities selected in the Final Operable Unit 3-13 Record of Decision. This document also provides the associated schedule, health and safety, quality, and other required documentation.

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FIGURES

TABLES

ACRONYMS

ACM	asbestos-containing material
ALARA	as low as reasonably achievable
ARAR	applicable or relevant and appropriate requirement
BBWI	Bechtel BWXT Idaho, LLC
CC	construction coordinator
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	contaminant of concern
CPP	Chemical Processing Plant
CWP	Characterization Work Plan
DOE	Department of Energy
DOE-ID	Department of Energy Idaho Operations
DOT	Department of Transportation
EPA	Environmental Protection Agency
EZ	exclusion zone
FAOM	facility authority operation manager
FECF	Fuel Element Cutting Facility
FFA/CO	Federal Facility Agreement and Consent Order
FTL	field team leader
HASP	Health and Safety Plan
HEPA	high-efficiency particulate air
HMR	hazardous materials regulation
HSO	health and safety officer
HWMA	Hazardous Waste Management Act
IAEA	International Atomic Energy Agency
ICDF	INEEL CERCLA Disposal Facility

IDAPA	Idaho Administrative Procedures Act
IDEQ	Idaho Department of Environmental Quality
IH	industrial hygiene
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
LDR	land disposal restriction
LSA	low-specific activity
MCP	management control procedure
NRC	Nuclear Regulatory Commission
NTS	Nevada Test Site
OSHA	Occupational Safety and Health Administration
OU	operable unit
PEW	process equipment waste
PM	project manager
POC	point of contact
POD	plan of the day
PPE	personal protective equipment
PRD	program requirements document
QA/QC	quality assurance/quality control
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RCT	radiological control technician
RD/RA	remedial design/remedial action
RE	radiological engineer
RFP	Request for Proposal
RG	regulatory guide

ROD	Record of Decision
RWMC	Radioactive Waste Management Complex
RWP	radiological work permit
SE	safety engineer
SFE	Storage Facility Exterior
SH&QA	safety, health, and quality assurance
SOW	Scope of Work
SRPA	Snake River Plain Aquifer
SZ	support zone
TBC	to be considered
TL	task leader
TRU	transuranic
VES	vessel
VOC	volatile organic compound
WAC	Waste Acceptance Criteria
WAG	waste area group
WCS	waste control specialists
WGS	Waste Generator Services
WMP	Waste Management Plan
WP	work plan

Remedial Design/Remedial Action Work Plan for the VES-SFE-20 Hot Waste Tank System

1. INTRODUCTION

In accordance with the Idaho National Engineering and Environmental Laboratory (INEEL) Federal Facility Agreement and Consent Order (FFA/CO) (DOE-ID 1991), the Department of Energy Idaho Operations Office (DOE-ID) submits this Remedial Design/Remedial Action (RD/RA) Work Plan (WP) for the Vessel-Storage Facility Exterior-20 (VES-SFE-20) hot waste tank system within the Waste Area Group (WAG) 3. The RD/RA activities identified in this WP, as part of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) process, will proceed in accordance with the signed Operable Unit (OU) 3-13 Record of Decision (ROD) (DOE-ID 1999) and the RD/RA Scope of Work (SOW) (DOE-ID 2000) for WAG 3, OU 3-13. This RD/RA WP provides the framework for defining the remedial design requirements, preparing the design documentation, and defining and implementing the construction and operations phases for remediation of the VES-SFE-20 hot waste tank system.

WAG 3 is a collection of contamination sites at the Idaho Nuclear Technology and Engineering Center (INTEC) at the INEEL. Over years of operation, releases of radioactive and hazardous materials to the environment occurred that later were grouped together and collectively identified as WAG 3. Because of significant differences between the various release sites at INTEC, WAG 3 was divided into 14 OUs. OU 3-13 is divided into seven groups. The seven groups are

- Tank Farm Soils (Group 1)
- Soils Under Buildings and Structures (Group 2)
- Other Surface Soils (Group 3)
- Perched Water (Group 4)
- Snake River Plain Aquifer (Group 5)
- Buried Gas Cylinders (Group 6)
- SFE-20 Hot Waste Tank System (Group 7).

Group 7 (also known as release site CPP-69) consists of a concrete vault containing an abandoned radioactive liquid waste tank (referred to as VES-SFE-20), an access tunnel, a pump pit, CPP-642 pump house, ancillary piping and structures and components, and contaminated soils associated with releases from the tank. For this document, the entire system will be referred to as the VES-SFE-20 tank system, VES-SFE-20 will be used to specifically reference the tank. The tank is believed to contain about 33 gal of radioactive sediment. As part of the CERCLA process mandated by the FFA/CO (DOE-ID 1991), the investigation and remediation approach for Group 7 was evaluated through the OU 3-13 remedial investigation and feasibility study process. As documented in the OU 3-13 ROD, the selected remedial approach for Group 7 is to remove the tank and its contents; the vault; the remainder of the structures, piping, and other components; and surrounding contaminated soils and transport them for either on-Site or off-Site storage or disposal.

1.1 HWMA/RCRA Closure Plan

Hazardous Waste Management Act (HWMA)/Resource Conservation and Recovery Act (RCRA) closure of the VES-SFE-20 tank system will occur in accordance with the State of Idaho HWMA/RCRA Closure Plan (IDEQ 2002). That plan presents the HWMA/RCRA, Idaho Administrative Procedures Act (IDAPA) 58.01.05.009 (40 CFR 265, Subpart G) closure requirements and methods for achieving the closure performance standards. This closure will be performed in conjunction with the CERCLA remediation of the VES-SFE-20 tank system. Both the remedy required under the OU 3-13 ROD and the closure of the tank system under the Closure Plan are protective of human health and the environment and will prevent future releases of hazardous constituents and radionuclides into the environment.

The potential contaminants of concern, identified in Section 3.1 of the Closure Plan (contaminants of concern), include cadmium; chromium; acetone; methylene chloride; 1,1,1-trichloroethane; tetrachlorothene; and formaldehyde. The HWMA/RCRA Closure Plan requires that the presence of these contaminants and all related underlying hazardous constituents be verified during the characterization of the tank contents. If, following approval of an adequate sampling report of the tank contents, the Idaho Department of Environmental Quality (IDEQ) determines no hazardous constituents of concern are detected at levels that trigger hazardous waste regulations, then the tank will be considered free of hazardous waste. Upon receipt of data from the tank characterization activities and subsequent review of that data, DOE may submit a request to IDEQ to modify the Closure Plan for no further action for purposes of HWMA/RCRA closure. Follow-on remediation activities will continue according to this WP.

1.2 Background

The INTEC is a facility located within the INEEL in southeastern Idaho near Idaho Falls (see Figure 1-1). Operations at INTEC (formerly the Chemical Processing Plant [CPP]; see Figure 1-2 for location at that site) began in 1952 and continue to the present. The VES-SFE-20 tank system was constructed in 1957 to collect radiologically contaminated liquids from floor drains in Building CPP-603.

The Fuel Element Cutting Facility (FECF) in CPP-603 south basin area sent radioactive liquid waste from the floor drains to the VES-SFE-20 tank. This facility was used to cut aluminum-clad fuel originating from a test reactor at the Savannah River Facility. The FECF conducted fuel-cutting operations beginning in 1959 and ending in 1962. Liquid waste collected in the VES-SFE-20 tank was then pumped to the Process Equipment Waste (PEW) Evaporator Facility for treatment. At the conclusion of fuel-cutting activities, acid was added to the tank, and the tank was heated to dissolve fine cuttings in the tank and lines that had passed through the strainers in the floor drains. This solution was then pumped to the PEW facility for treatment. In addition, the tank received backwash water from the filter system that removed contaminants from the CPP-603 basin water. These contaminants included radionuclides from leaking fuel casks. In 1976, primarily due to the insufficient working capacity of the VES-SFE-20 tank, it was removed from service and replaced with the larger capacity VES-SFE-126 tank. The VES-SFE-20 tank has not been used since. The inlet pipe was disconnected approximately 7 ft from the vault and connected to the new VES-SFE-126 system. The pipe leading to the VES-SFE-20 tank was capped. The 1/2-in.-diameter sample line extends inside the tank to just above the bottom. The line runs over to the pump pit and then up into the compressor building, where it has been cut and capped. The 1-in.-diameter sample return line has also been cut and capped in the compressor building. The pump was removed from the pump pit and the connections capped.

Building CPP-642 is not in operation but contains utilities and transfer lines that support adjacent waste holding tanks (VES-SFE-106/126), which are routed through CPP-642 and above the tank vault and access tunnel.

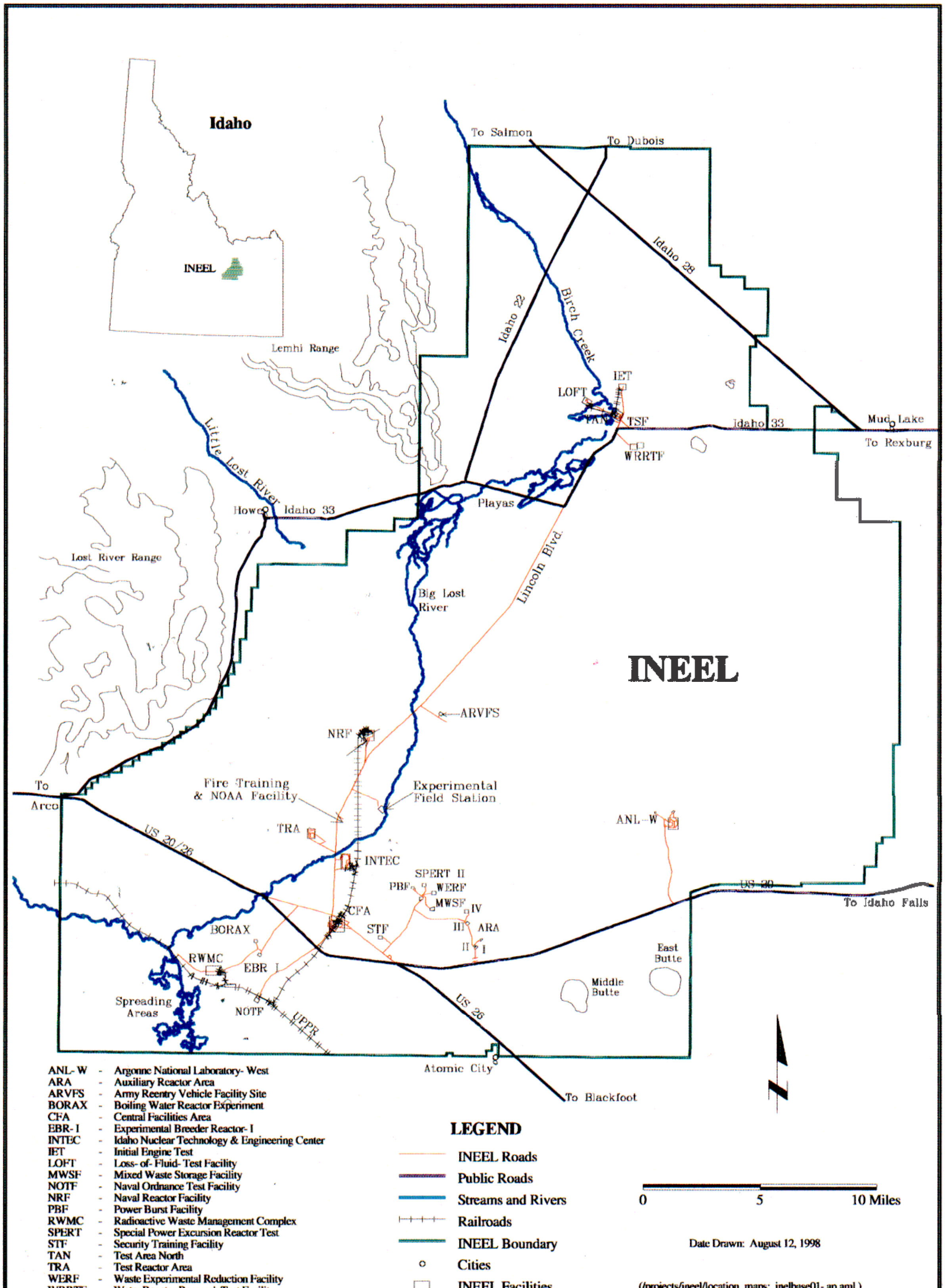


Figure 1-1. Map of the INEEL.

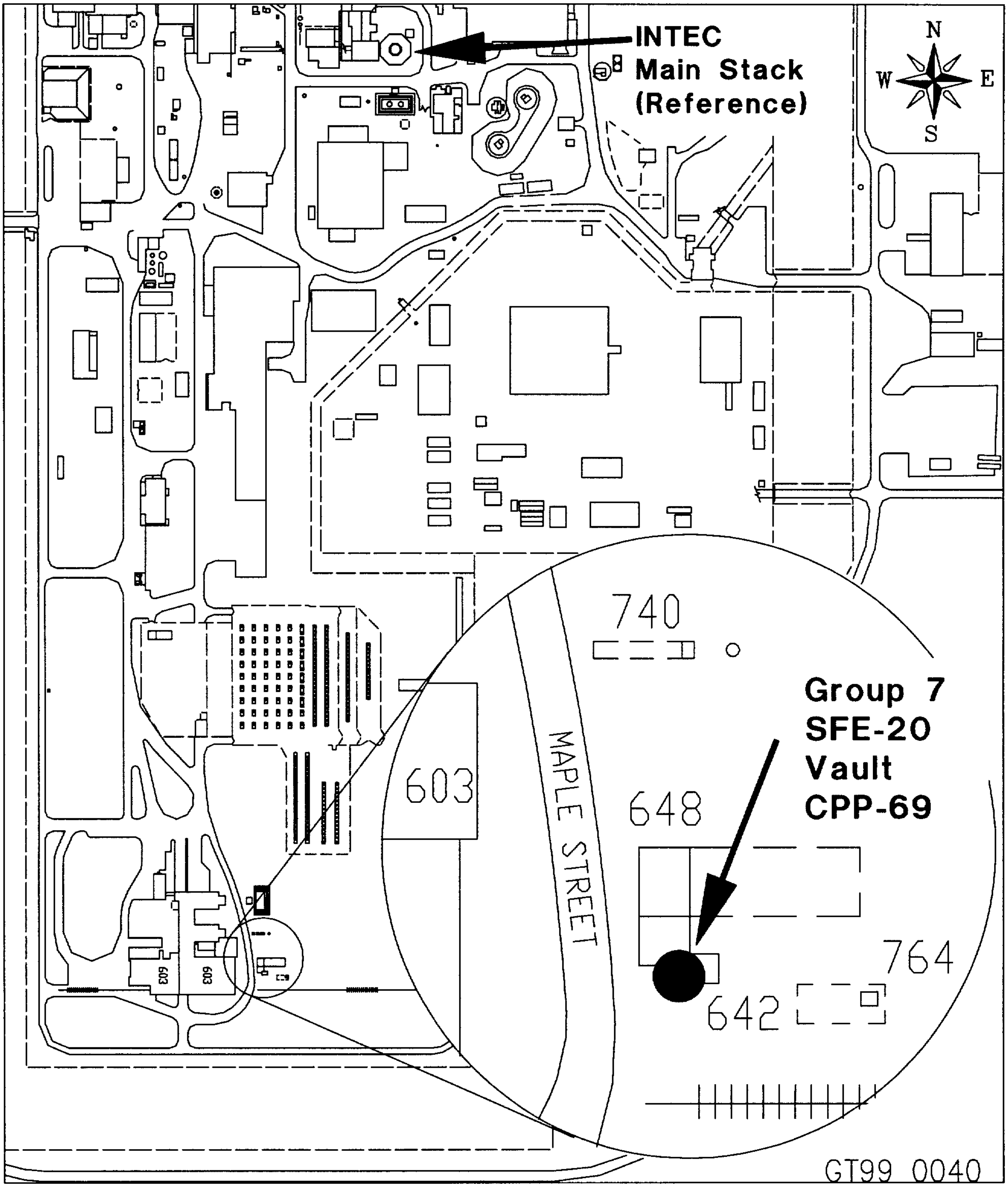
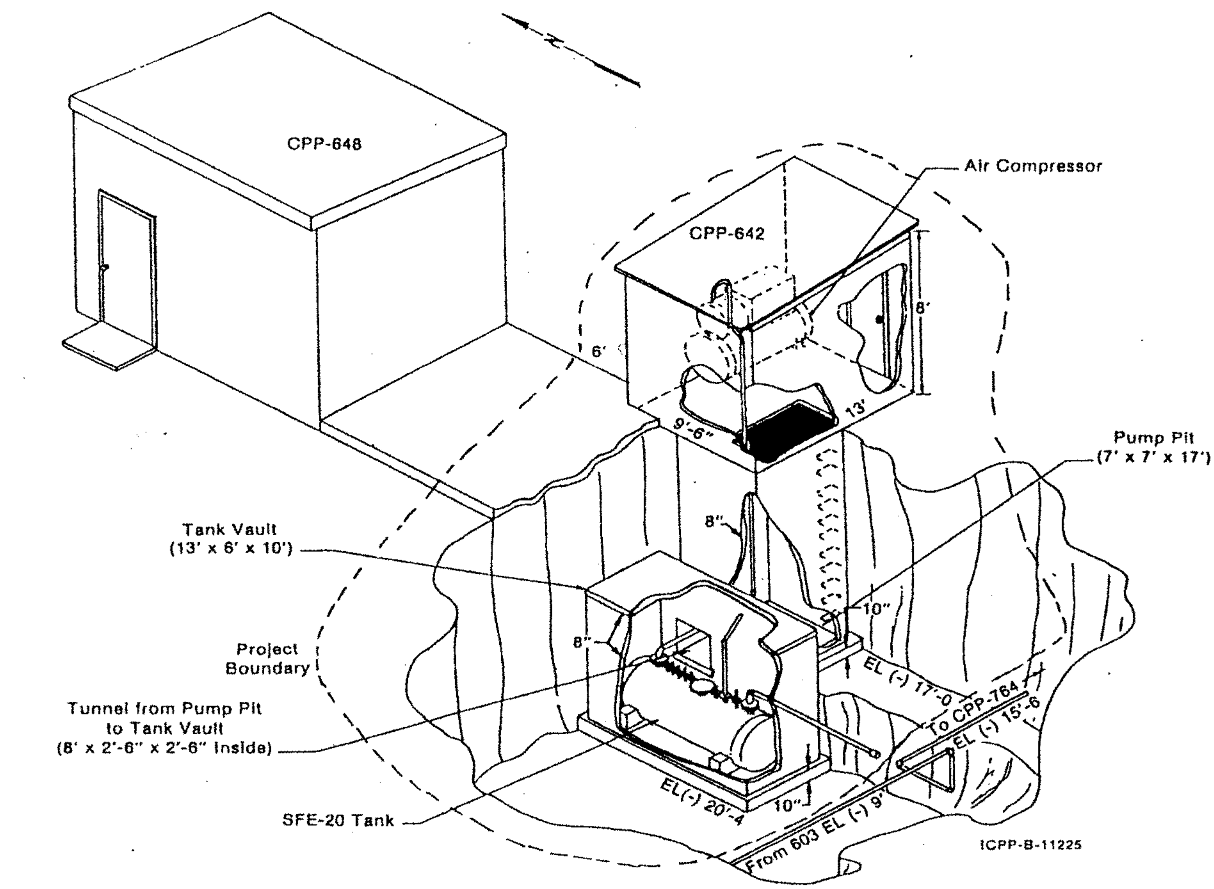


Figure 1-2. Location of the VES-SFE-20 tank in WAG 3.

1.3 VES-SFE-20 Tank System

The VES-SFE-20 tank system is located east of Building CPP-603 (Figure 1-2). The vault and other major components of the VES-SFE-20 tank system are shown in Figure 1-3. The potential extent of soil contamination around and below the vault will not be known until remedial actions are in progress. The utility lines (air, water, steam, condensate, electrical conduit, etc.) that fed the VES-SFE-20 tank and that transported the waste to the PEW were isolated from this tank and incorporated into other tank systems when the use of the VES-SFE-20 tank was discontinued in 1976. The remediation of the VES-SFE-20 tank system is designed to occur in two remedial phases. This phased approach allows for removal of the tank and waste, while allowing flexibility for coordination of the removal of the vault and associated structures and soils with other related remedial actions in that area, such as the WAG 3, Group 3—Other Surface Soils. Phase I and Phase II may be completed sequentially.



Isometric view of tank vault and pump pit.

Figure 1-3. Isometric view of the tank vault and pump pit.

The VES-SFE-20 tank piping located in the vault is listed below (see Figure 1-4):

- Two-Inch Pump Suction (Effluent) Line—This line will be removed to where the line is capped off in CPP-648. The line is 1.5 in. in diameter outside of the tank vault.
- Half-Inch Suction and One-Inch Drain Lines—These lines were used for sampling the tank.
- One-Inch Steam Line—This item consists of two lines, one that fed steam to the tank and one that returned condensate. The line enters the tank on one end, coils through the bottom of the tank for heating of the contents of the tank, and exits the tank on the other end.
- Half-Inch Liquid Level Line—This line was used to detect the liquid level in the tank.
- One-Inch Sparge Line—This line was used for air sparging to mix the tank contents.
- Two-Inch Acid Fill Line—This line was used for adding nitric acid to the tank and leads to the surface.
- Two-Inch Vent Line—This line contains a high-efficiency particulate air (HEPA) filter.
- Four-Inch Drain (Influent) Line—This is the influent line from the floor drains. It has been capped approximately 7 ft south of the VES-SFE-20 tank vault and is isolated from the Building CPP-603 floor drain system and other tanks.

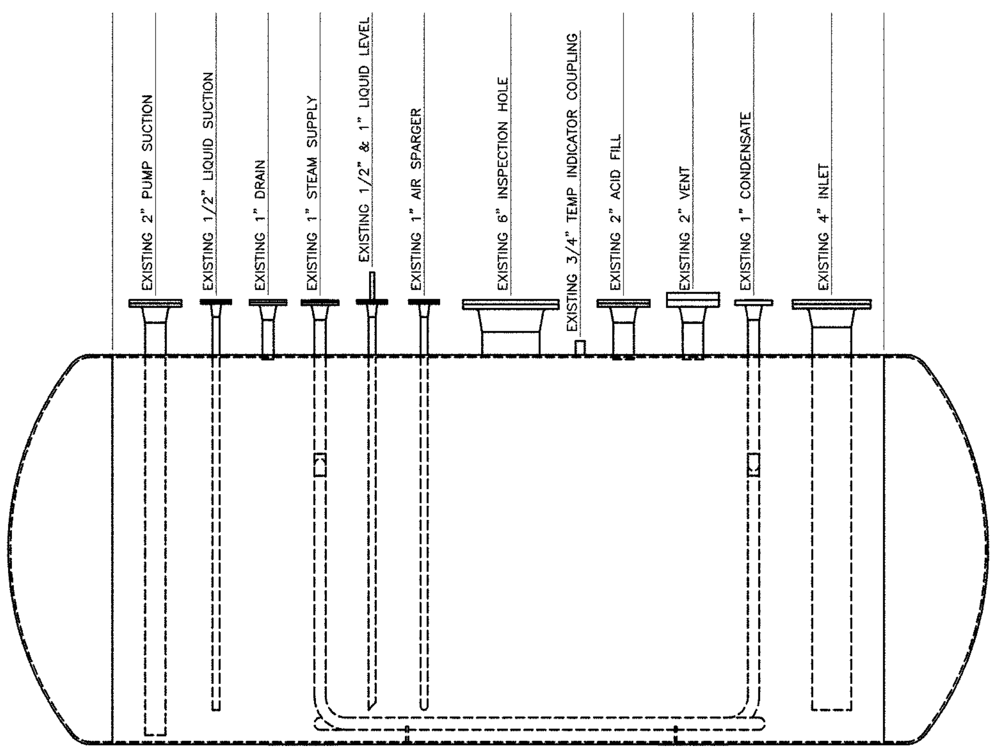


Figure 1-4. Elevation view of VES-SFE-20 tank and piping.

1.4 Past and Current Characterization

This section describes the past and current characterization efforts.

1.4.1 Past Characterization

Past characterization efforts included preliminary radiological measurements and analysis for samples collected from the pump pit, access tunnel, and vault and videotaped conditions within the tank and vault.

- In 1984, the contents of the VES-SFE-20 tank—approximately 208 L (55 gal) of sediment and approximately 1,514 L (400 gal) of liquid—were sampled for radiological content only (WINCO 1984). Those analytical results can be found in the *Characterization Work Plan for the VES-SFE-20 Hot Waste Tanks at INTEC* (DOE-ID 2003a). The sediment samples from the bottom of the tank were evaluated for Pu-238 and Pu-239 and a combined concentration of 93.5 nCi of Pu-238/239 per gram of sediment was determined. Because of the decay of Pu to other transuranic materials and the presence of other materials that are always present in spent fuel material (most notably Np and Am), a revised estimate of the total transuranic (TRU) curie content in the sediment was made. This estimate was made based on knowledge that the source for the radioactive material was cuttings from Savannah River Plant spent fuel assemblies and the age of the material was approximately 25 years. Based on this information, the revised estimate for the sediment material was 117 nCi/g (EDF-2360), Attachment 7.

  No subsurface core samples were taken of the soils above the VES-SFE-20 tank due to the buried lines and conduits in the area. However, in 1976, an excavation was performed to cut and cap the inlet pipe to VES-SFE-20 (2 m [7 ft] south of the tank vault) and route the line to the new VES-SFE-126 tank. A common INTEC practice was to backfill, to within 0.9 to 1.2 m (3 to 4 ft) of the surface, with the slightly contaminated soils encountered during excavation. Therefore, there is a possibility that the subsurface soil near the south end of the VES-SFE-20 tank vault is contaminated.

- An entry into the *VES*-SFE-20 tank vault was performed in 1991 to evaluate conditions in preparation for decontamination and dismantlement work; however, no further action was taken. The 1991 entry was videotaped and provided information on general conditions in the vault.

1.4.2 Current Characterization

Current characterization efforts include a camera inspection inside the tank and tank vault; radiological readings from inside the tank, tank vault, and pump pit; and sampling efforts.

- In June 2002, a remote camera entry was made into the VES-SFE-20 tank. Upon camera entry into the tank, it was noted that there was no visible standing liquid in the tank, although some clear fluid (assumed to be condensate) was dripping into the tank. At the present time, no formal record has been found to indicate what may have occurred to explain the absence of the liquid that was present in the tank in 1984 (see Figure 1-5). The camera was lowered to touch the top of the sediment, and, based on marked measurements on the camera cord and the diameter of the tank, the sediment was determined to be 3-4 in. in depth. Upon removing the camera from the vent line, residual sediment on the camera provided a color and physical consistency similar to that of wet clay soil native to the INEEL. An image of the sediment within the tank is shown in Figure 1-6 (blue tint in Figure 1-6 is a result of auxiliary lighting provided for the camera).

Figure 1-5. Photograph of tank and interior of vault taken during 1984 entry.

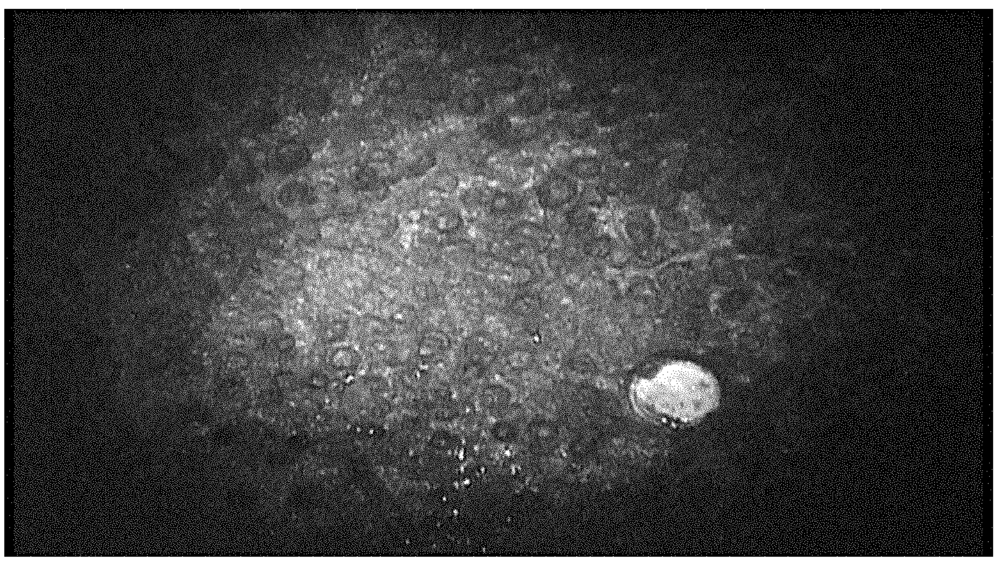


Figure 1-6. Image of sediment at the bottom of the VES-SFE-20 tank.

- In July 2002, a remote camera entry was made into the VES-SFE-20 tank vault. This remote inspection revealed no standing water at the base of the vault and showed the integrity of the tank is similar to that shown in the 1984 inspection of the tank vault (see Figure 1-5).

- In November 2002, radiation readings inside the tank were obtained by inserting an HP290 radiation detector into the tank through the vent line. The readings were taken using an Eberline E600 instrument. The radiation levels measured were as follows:

Location:	Reading:
Vent line, 12 ft into pipe (1st 90° turn)	<1 mR/h
Vent line, 22 ft into pipe (2nd 90° turn)	60 mR/h
(near) Tank entry, 26 ft into pipe	870 mR/h
1 ft into tank	1.5 R/h
2 ft into tank	2.67 R/h
3 ft into tank	5.7 R/h
Sediment contact	6.3 R/h

Additionally, sampling for lower explosive limit, CO, NO, NO_2, and O_2 was performed using an Industrial Scientific iTX instrument. The instrument ran for 17 min. An H-Nu PID was then run for 5 min after the iTX for total organics. The results are as follows:

0% LEL	0 ppm NO
20.7% O_2	0 ppm CO
0.0 ppm NO_2	6 ppm max total organics

Total organic results from this specific test are used to assess the airborne exposure to organic compounds only and not for analytical purposes.

- On January 14, 2003, a sampling effort was conducted to obtain a sample of the tank sediment for characterization analysis. This sampling effort utilized the 2-in. vent line to access the sediment. Several attempts were made to gather a sample with the sampling device shown in Figure 1-7. The device was attached to a tether made of several small plastic tubes containing wire that are encased in an expandable nylon wrapping and sent down the vent line. These attempts were unsuccessful due to the consistency of the sediment.

  Based on those results, a second attempt to obtain a sample was made on January 21, 2003, using newly developed sharp tips for the sampling tool. Several attempts were made to collect a sample; however, none were successful. The following day, a video camera was sent back down the vent line to try and assess the surface condition of the sediment. The inspection showed depressions in the sediment and evidence of the sample tool being in contact with the material (see Figures 1-8 and 1-9). Since the previous attempts were unsuccessful through the vent line, a decision was made to proceed to a manned entry sampling process.

- On February 21, 2003, a manned entry into the VES-SFE-20 pump pit and vault was attempted to collect samples from the tank. A survey of the pump pit was completed. Upon surveying the VES-SFE-20 tank vault, the radiation fields were found to be higher than expected. The radiation levels exceeded the safe limits as documented in the radiological work permit (RWP); thus, the work was stopped due to unsafe work conditions. The Agencies were notified and it was later agreed that sampling of the tank contents would take place during Phase I remediation efforts upon exhumation of the tank. Sampling of the tank is covered in the Characterization Work Plan (CWP).

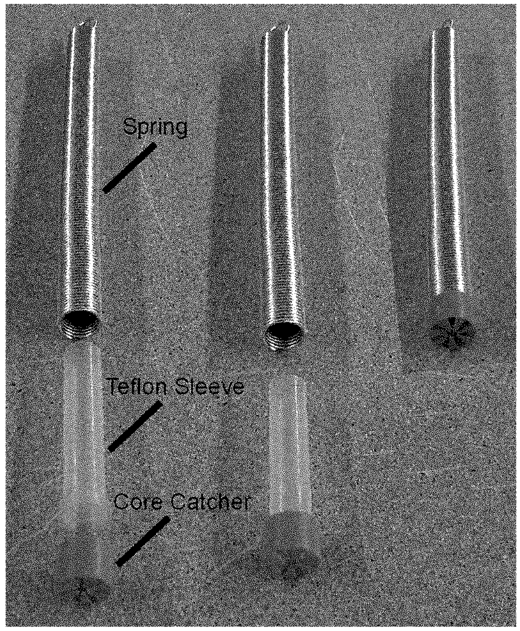


Figure 1-7. Sampling device.

Figure 1-8. Still image of sediments within the VES-SFE-20 tank after sampling attempts were made.

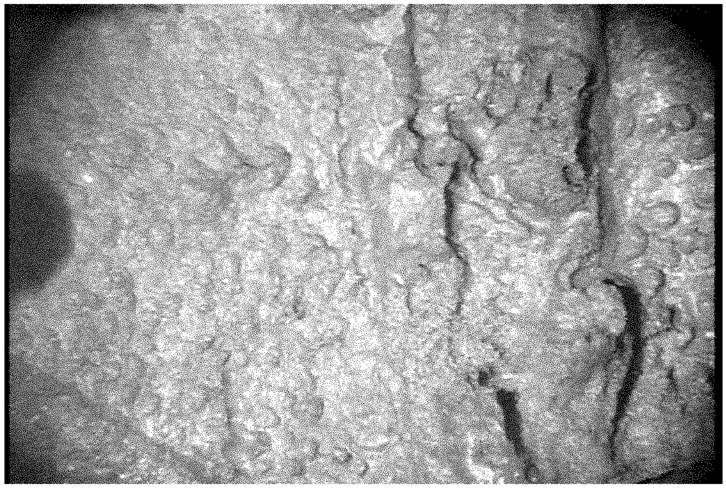


Figure 1-9. Detail of still image of sediments within the VES-SFE-20 tank after sampling attempts were made.

1.5 Selected Remedy

The selected remedy for the VES-SFE-20 hot waste tank system, as identified in the *Final Record of Decision, Idaho Nuclear Technology and Engineering Center, OU 3-13* (DOE-ID 1999) is removal, treatment, and disposal. The remedy was selected based on the following evaluation criteria: protection of human health and the environment; compliance with applicable or relevant and appropriate requirements (ARARs); long- and short-term effectiveness; reduction of toxicity, mobility, or volume of contaminants; implementability; and cost. The remedy consists of

- Institutional controls (i.e., warning signs) until removal of the tank liquid and sludge
- Sampling the tank contents
- Removal and ex situ treatment of the tank liquid and sludge
- Excavation and removal of the tank, tank vault, pump pit enclosures, and other associated structures
- On-Site disposal of the tank and associated structures.

Section 11.1.7 of the OU 3-13 ROD states that, following characterization, the tank liquid will be removed and treated at the PEW evaporator if it meets the specified waste criteria. Then, the tank sludge will be removed and treated (ex situ) using a suitable grout to solidify and stabilize the contaminants in the sludge. The stabilized sludge will then be drummed and disposed either on-Site or off-Site at a suitable engineered disposal facility. Depending on waste characteristics, the remaining components of the tank system will be excavated, removed, and disposed of in the INEEL CERCLA Disposal Facility (ICDF) or off-Site, depending on whether they meet the ICDF Waste Acceptance Criteria (WAC). The excavation will be backfilled to grade with clean soil. The ROD assumed that the liquid within the SFE-20 tank will meet the PEW WAC but noted that if the PEW is unable to accept the liquid waste or is unavailable at the time the response action is conducted, a small portable evaporator unit would be utilized on-Site; or the waste would be disposed off-Site in accordance with the off-Site Rule (40 CFR 300.440). Additionally, the OU 3-13 ROD declaration specifies the following:

- Land dispose treated waste, tank, vault, and other debris. The preferred disposal site is the ICDF; however, if any residue or material fails to meet the ICDF WAC, an alternate suitable disposal facility will be identified during the remedial design.

- Remove and treat off-Site, if wastes found in the tank are alpha-LLW (i.e., exceed 10 nCi/g TRU constituents [alpha emitters with an atomic number greater than 92 and a half-life exceeding 20 years]) or TRU wastes (i.e., greater than 100 nCi/g TRU).

1.6 Strategy for Implementation of the Selected Remedy

The following provides a summary of this WP's strategy for implementation of the selected remedy.

1. Institutional Controls: Institutional controls in the form of signage and excavation controls have been implemented for CPP-69, the VES-SFE-20 tank system site. Institutional controls will remain in place until the site meets the remediation goals for OU 3-13 as specified by the Agencies.

2. Additional Requirements: The State of Idaho approved and modified a HWMA/RCRA Closure Plan for the VES-SFE-20 Hot Waste Tank System in May 2002 and September 2002, respectively. The CERCLA remediation of the VES-SFE-20 tank system is being performed in a manner to meet the CERCLA objectives, and also satisfy the additional requirements imposed by the HWMA/RCRA Closure Plan.

3. Tank Characterization: Characterization to determine the contaminants of the tank and vault was initiated in 2002, starting with a video inspection in June to visually assess the tank contents through a vent line. This was followed with collection of radiological readings in November that confirmed the tank sediment is highly radioactive. This assessment noted that no visible standing liquid was present in the tank with the exception of a small volume that appeared to be condensate/drips from the top of the tank. An unsuccessful effort to sample the tank contents through the vent line was performed in January 2003. This effort and a subsequent camera entry determined that there is no separate aqueous phase observable on the surface of the tank contents. In light of this new information, it was identified that the tank contents would not be eligible for the PEW system, given the lack of an aqueous phase. Calculations of the tank contents were performed using 1984 sample data and it was estimated that the sediment, if managed separately, would be above 100 nCi/g TRU. The CERCLA CWP (DOE-ID 2003a) identified that a manned entry into the tank vault would be attempted if efforts to sample remotely failed. An entry was made in February 2003, but work was stopped due to unsafe circumstances from unexpectedly high radiation fields in the VES-SFE-20 tank vault. It was later decided that sampling the tank would take place during the Phase I remediation effort. Sampling efforts will be performed in accordance with the CWP.

4. Excavation and Removal of the Tank System: This WP provides for the removal of the VES-SFE-20 tank system and any contaminated soils beneath the vault. Soils beneath the vault will be characterized and removed if found to be in excess of the OU 3-13 remediation goals. Excavation of soils beneath the vault will continue until the remediation goals are met or bedrock is reached.

5. Management of Tank System and Tank Contents: Based on the evaluation of the tank and contents, it has been estimated that they would not meet the WAC for the ICDF due to the level of TRU constituents. As specified in the OU 3-13 ROD Declaration, the WP has identified an off-Site facility for the treatment and disposal of this waste stream. This off-Site facility will be subject to

an acceptability determination (40 CFR 300.440) prior to shipment of any waste. The WP provides information on the removal and transport of the VES-SFE-20 tank and contents to this off-Site facility for management. The off-Site facility has the capability to manage radiologically contaminated wastes at the levels calculated for the contents of the VES-SFE-20. In addition, the off-Site facility has the capability to provide treatment and subsequent disposal for hazardous wastes, if applicable.

6. Management of Contaminated Soil: Phase I is being performed to focus on the removal of the primary threat – the tank and its contents. During Phase I excavation activities, a radiological survey will be performed by radiation control technicians (RCTs) to ensure that DOE worker safety requirements are being met. Soils that exceed the screening level will be removed and managed as a waste in accordance with the Waste Management Plan (WMP). Soils that do not exceed the screening level will be used as backfill following the completion of the Phase I activities. Phase II addresses the remediation of the remaining structures, equipment, and contaminated soil. The soil removed during Phase II activities will be screened using gamma spectrometry to determine if OU 3-13 CERCLA remedial action objectives (RAOs), regulatory guides (RGs), and "reuse" criteria are met. Soil deemed acceptable for "reuse" will be stockpiled for backfill purposes; soil deemed unacceptable for "reuse" will be segregated to remediation waste piles and characterized for disposal.

1.7 Environmental and Safety Requirements

The remedial design complies with the action-, chemical-, and location-specific ARARs for the selected remedy and are summarized in Section 5.1, Table 5-1. In addition, current radiological and industrial hygiene control practices will be used to reduce worker exposure to radioactive and hazardous materials.

1.8 RD/RA Work Plan Organization

This WP outlines the major activities to be completed in implementing the remedial action for the WAG 3, Group 7, VES-SFE-20 tank system project in accordance with the OU 3-13 ROD. The WP describes the site, contaminants of concern, ARARs, project management, tasks, schedules, and cost estimates. The following are brief descriptions of the WP's sections and appendixes:

- Section 1 describes the background and history of WAG 3, Group 7, and provides an overview of the selected remedy for the VES-SFE-20 tank system.

- Section 2 describes the organizational structure for this project.

- Section 3 provides the design basis and design description, including the design codes and standards, assumptions, RAOs, and quality assurance.

- Section 4 discusses the remedial design of the project.

- Section 5 discusses the environmental compliance elements of the VES-SFE-20 hot waste tank system for the potential risks to human health and the environment. The ARARs are discussed in this section.

- Section 6 describes the RD/RA WP including the necessary steps and documentation required for completing the remedial action, as described in Sections 1 through 4. The required work tasks, project cost estimates, inspections, subcontractor requirements, and environmental and safety plans are discussed in this section.

- Section 7 describes the necessary actions involved for each 5-year review to occur after the remedial action has taken place.

- Section 8 lists references.

Following Section 8 are the appendixes as listed below:

- Appendix A, Project Schedule, gives major tasks for both Phase I and II.

- Appendix B, Project Cost Estimate, provides the cost estimate.

- Appendix C, Prefinal Inspection Checklists, provides the RA elements covered in the inspection determined to be significant to meeting the ROD requirements.

- Appendix D, Responses to Comments, provides responses to comments from both EPA and IDEQ.

Several attachments provide additional information to the WP package. These are listed below:

1. Construction Drawings–VES-SFE-20 Hot Waste Tank Remedial Design – Phase I: This attachment contains the drawings that detail the present conditions (e.g., topography and fencing) at the site, the work to be performed, and the general terms and conditions required for completion of the remedial action for Phase I.

2. Construction Drawings–VES-SFE-20 Hot Waste Tank Remedial Design – Phase II: This attachment contains the drawings that detail the conditions (e.g., topography and fencing) at the site following Phase I, the work to be performed, and the general terms and conditions required for completion of the remedial action for Phase II.

3. VES-SFE-20 Hot Waste Tank Retrieval and Demolition Structural Design Engineering Design File (EDF-3282).

4. OU 3-13, Group 7, VES-SFE-20 Hot Waste Tank System Remediation Underground Utilities Study Engineering Design File (EDF-3266).

5. VES-SFE-20 Hot Waste Tank Remedial Design Excavation Estimates Engineering Design File (EDF-3254).

6. TRU Constituent Calculations and the Proposed Disposal Path for the VES-SFE-20 Hot Waste Tank and Contents Engineering Design File (EDF-3273).

7. TRU Calculations for SFE-20 Waste Tank Engineering Design File (EDF-2360).

8. Field Sampling Plan for the VES-SFE-20 Hot Waste Tank System at INTEC (DOE/ID-11047).

9. Waste Management Plan (WMP) for the VES-SFE-20 Hot Waste Tank System (DOE/ID-11049).

10. Health and Safety Plan (HASP) for the VES-SFE-20 Hot Waste Tank System (INEEL/EXT-02-01436).

2. ORGANIZATION

The organizational structure for this project reflects the required resources and expertise to perform the work, while minimizing risks to worker's health and safety, the environment, and the public. The positions and names of the individuals in key roles at the site and lines of responsibility and communication are shown on the organizational chart for this project (Figure 2-1). The following sections outline the responsibilities for project personnel, INTEC support staff, and nonfield support staff.

2.1 Field Team

2.1.1 Field Project Personnel

All field team members, including Bechtel BWXT Idaho, LLC (BBWI) and subcontract personnel, shall understand and comply with the requirements of this RD/RA WP. The field team leader (FTL) and health and safety officer (HSO) will jointly conduct the plan-of-the-day (POD) briefing at the start of each shift. All tasks to be conducted, associated hazards, hazard mitigation, emergency conditions, and emergency actions will be discussed. Input will be provided by the project HSO, industrial hygiene (IH), safety engineer (SE), and Radiological Control personnel to clarify task health and safety requirements. All personnel are encouraged to provide input and ask questions for clarification of tasks and hazard mitigation methods based on previous lessons learned. Documentation of the POD will be recorded daily in the FTL logbook.

2.1.2 Construction Coordinator

The field construction coordinator (CC) is the individual with ultimate responsibility for the safe and successful completion of assigned project tasks. The CC manages field operations; executes the work plan; enforces site control; documents site activities; and may, at the start of the shift, conduct the daily prejob safety briefings. Health and safety issues at the site must be brought to the construction manager/field CC's attention.

If the field CC leaves the site, an alternate individual will be appointed to act as the field CC. The identity of the acting field CC shall be conveyed to site personnel, recorded in the field CC daily force report, and communicated to the facility representative when appropriate.

2.1.3 Task Leader

The task leader (TL) represents the organization at the project with delegated responsibility for the safe and successful completion of the project. The TL works with the project manager (PM) to manage field sampling or operations and to execute the WP. The TL enforces site control, documents activities, and may conduct the daily safety briefings at the start of the shift. Health and safety issues must be brought to the attention of the TL.

If the TL leaves the site, an alternate individual will be appointed to act as the TL. The identity of the acting TL will be conveyed to site personnel, recorded in the TL logbook, and communicated to the facility representative, when appropriate.

2.1.4 Health and Safety Officer

The HSO is the representative assigned to the project who serves as the primary contact for health and safety issues. The HSO advises the safety, health, and quality assurance (SH&QA) point of contact (POC), PM, and TL on all aspects of health and safety and is authorized to stop work at the site if any

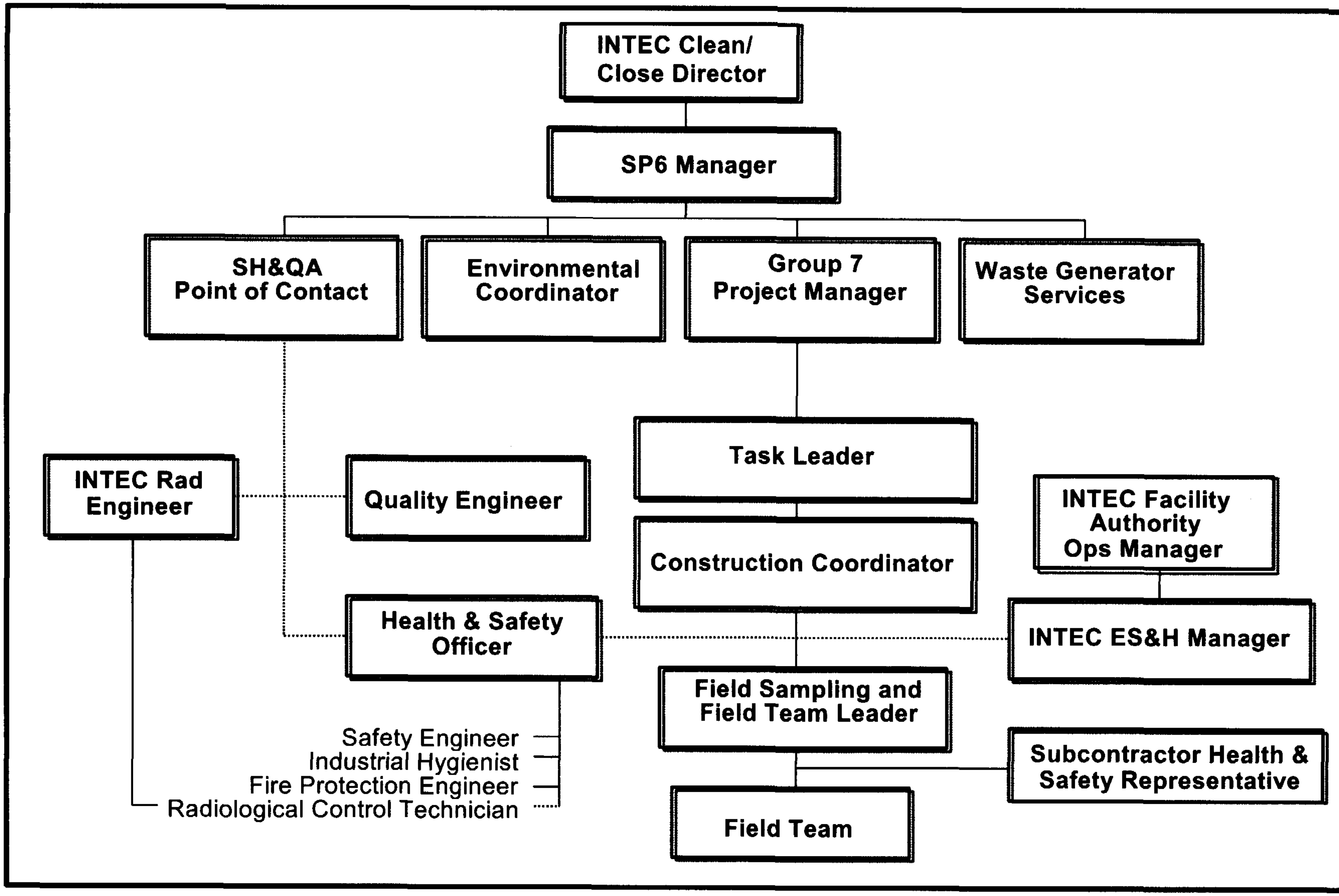


Figure 2-1. Field organization chart for the OU 3-13, Group 7, VES-SFE-20 hot waste tank system.

operation threatens worker or public health and/or safety. The HSO may be assigned other responsibilities, as long as they do not interfere with the primary responsibilities. The HSO is authorized to verify compliance to the HASP, conduct inspections, require and monitor corrective actions, monitor decontamination procedures, and require corrections, as appropriate. The HSO is supported by SH&QA professionals at the site (SE, IH, RCT, radiological engineer [RE], environmental coordinator, and facility representative, as necessary) and the SH&QA POC.

Persons assigned as the HSO, or alternate HSO, must be qualified (per the Occupational Safety and Health Administration [OSHA] definition) to recognize and evaluate hazards and will be given the authority to take or direct actions to ensure that workers are protected. While the HSO may also be the IH, SE, or the TL (depending on the hazards, complexity, size of the activity involved, and required concurrence from the SH&QA manager) at the site, other HSO's site responsibilities must not conflict (philosophically or in terms of significant added volume of work) with the HSO's primary role.

2.1.5 Occasional Workers

All persons who may be on the site, but are not part of the field team, are considered occasional workers for the purposes of this project (e.g., surveyor, equipment operator, or other crafts personnel not assigned to the project). A person will be considered "on-site" when they are present in or beyond the designated support zone (SZ). Occasional workers per 29 CFR 1910.120/1926.65 shall meet minimum training requirements. If the nature of an occasional worker's tasks requires entry into the exclusion zone (EZ) or radiologically controlled areas, then they must meet all the same training requirements as other field team members. In addition, a site representative must accompany all occasional workers until they have completed three days of supervised field experience.

2.1.6 Visitors

All visitors with official business at the site, including INEEL personnel, representatives of Department of Energy (DOE), and/or state or federal regulatory agencies, may not proceed beyond the SZ without receiving site-specific HASP training, signing a HASP training acknowledgment form, receiving a safety briefing, wearing the appropriate personal protective equipment (PPE), and providing proof of meeting all training requirements. A fully trained site representative (such as the FTL, job safety supervisor or HSO, or a designated alternate) will escort visitors at all times while on the site. A casual visitor to the site is a person who does not have a specific task to perform or other official business to conduct at the site. Casual visitors are not permitted on the site.

2.2 INTEC Support Staff

2.2.1 INTEC Facility Authority Operation Manager

The INTEC facility authority operation manager (FAOM) reports to the director of site operations and interfaces with the INTEC facility manager. The FAOM is responsible for several functions and processes within the INTEC controlled area that include the following:

- Performing all work processes and work packages
- Establishing and executing a monthly, weekly, and daily operating plan
- Executing the environment, safety, and health program
- Executing the Integrated Safety Management System

- Executing the enhanced work planning
- Executing the Voluntary Protection Program
- Maintaining all environmental compliance
- Executing that portion of the Voluntary Consent Order that pertains to the INTEC-controlled area.

2.2.2 Radiological Engineer

The RE and RCT will be responsible for all radionuclide screening and controls. The RE is the primary source for information and guidance relative to the evaluation and control of radioactive hazards at the site. The RE will provide engineering design criteria and review of containment structures and makes recommendations to minimize health and safety risks to site personnel. Responsibilities of the RE include performing radiation exposure estimates and as low as reasonably achievable (ALARA) evaluations, identifying the type(s) of radiological monitoring equipment necessary for the work, advising the TL and RCT of changes in monitoring or PPE, and advising personnel on the site evacuation and reentry. The RE may have other duties to perform as specified in other sections of the HASP (INEEL 2003) or applicable company manuals.

2.2.3 Radiological Control Technician

The assigned RCT is the primary source for information and guidance on radiological hazards and will be present at the site during all operations. Responsibilities of the RCT include radiological surveying of the site, equipment, and samples; providing guidance for radioactive decontamination of equipment and personnel; and accompanying the affected personnel to the nearest INEEL medical facility for evaluation if significant radionuclide contamination occurs. The RCT must notify the TL and HSO of any radiological occurrence that must be reported as directed by applicable company manuals.

2.3 Nonfield Support Staff

2.3.1 INTEC Clean/Close Director

The INTEC clean/close director has the ultimate responsibility for the technical quality of all projects, maintaining a safe environment, and the safety and health of all personnel during field activities performed by or for the program. The director provides technical coordination and interfaces with the DOE-ID Environmental Support Office. The director ensures the following:

- Project/program activities are conducted according to all applicable federal, state, local, and company requirements and agreements
- Program budgets and schedules are approved and monitored to be within budgetary guidelines
- Personnel, equipment, subcontractors, and services are available
- Direction is provided for the development of tasks, evaluation of findings, development of conclusions and recommendations, and production of reports.

2.3.2 Subproject 6 Manager

The INTEC clean/close Subproject 6 manager shall ensure that all activities conducted during the project comply with company management control procedures (MCPs) and program requirements directives (PRDs); all applicable OSHA, Environmental Protection Agency (EPA), DOE, U.S. Department of Transportation (DOT), and State of Idaho requirements; and all tasks comply with applicable company policies and procedures for the project. The manager is responsible for the overall work scope, schedule, and budget. The manager will ensure that an Employee Job Function Evaluation (Form-340.02) is completed for all project employees, reviewed for validation by the project IH, and then submitted to the Occupational Medical Program (OMP) for determination of whether a medical evaluation is necessary.

2.3.3 Group 7 Project Manager

The PM will ensure that all activities conducted during the project comply with Company MCPs and PRDs; all applicable OSHA, EPA, DOE, DOT, and State of Idaho requirements; and all tasks comply with applicable company policies and procedures, the Quality Assurance Project Plan, the HASP, and the Field Sampling Plan. The PM is responsible for coordination of all document preparation, field, laboratory, and modeling activities. The PM is responsible for the overall work scope, schedule, and budget. The PM will ensure that an Employee Job Function Evaluation (Form 340.02) is completed for all project employees, reviewed by the project IH for validation, and then submitted to the OMP for determination of whether a medical evaluation is necessary.

2.3.4 SH&QA Point of Contact

The Subproject 6 SH&QA POC, or designee, directs the SH&QA compliance activities by providing technical and administrative direction to project staff and through coordination with related INTEC SH&QA functional entities. The SH&QA POC reports directly to the Subproject 6 manager. Under the direction of the Subproject 6 manager, the SH&QA POC represents the project in all SH&QA matters. This includes assisting the Subproject 6 manager in being responsible for SH&QA compliance and oversight for CERCLA operations planned and conducted at the INTEC.

2.3.5 Environmental Coordinator

The assigned environmental coordinator oversees, monitors, and advises the PM and TL performing site activities on environmental issues and concerns by ensuring compliance with DOE orders, EPA regulations, and other regulations concerning the effects of site activities on the environment.

2.3.6 Quality Engineer

A quality engineer provides guidance on the site quality issues. The quality engineer observes site activities and verifies that site operations comply with quality requirements pertaining to these activities. The quality engineer identifies activities that do not comply or have the potential for not complying with quality requirements.

2.3.7 Waste Generator Services

Waste Generator Services (WGS) personnel are responsible for the compliant management of waste generated during the project. These personnel coordinate both with the Group 7 project manager as well as the CC and the TL. Their responsibilities include providing guidance on all aspects of waste characterization, waste storage, and waste disposal.

3. DESIGN BASIS

This section contains the basis and the objectives governing the remedial design. These objectives include those defined by the ROD, the major components required in the remedy to meet the ROD objectives, and the bounding INEEL objectives. The selected remedy for the VES-SFE-20 tank system will eliminate the threat of release to the Snake River Plain Aquifer (SRPA) posed by the tank system. The principal threats posed by the VES-SFE-20 tank system are external exposure and the potential for a contaminant release to the environment. This remedial design will meet the remediation goals by removing the tank, tank vault, associated piping, components, structures and contaminated soil surrounding the vault.

The following subsections of the design basis present the remedial action objective, control procedures, design description, DOE-related codes, standards and documents, engineering standards, design assumptions, quality assurance program requirements, and unresolved data needs.

3.1 Remedial Action Objective

The RAO for the VES-SFE-20 tank system (Group 7), OU 3-13, was developed in accordance with the National Contingency Plan and CERCLA Remedial Investigation/Feasibility Study guidance and defined in the ROD. The RAO is primarily based on the results of the baseline risk assessment and ARARs, as outlined in the ROD.

Table 3-1 below was taken verbatim from the ROD (Table 8-1). It provides the soil risk-based remediation goals, from the OU 3-13 ROD, for each of the contaminants of concern (COCs). Table 3-2, also taken verbatim from the ROD (Table 8-2), identifies the SRPA remediation goals. These remediation levels will be used as the cleanup requirements for this remediation effort.

Table 3-1. Soil risk-based remediation goals (verbatim from DOE-ID [1999]).

Contaminant of Concern	Soil Risk-Based Remediation Goal[a] for Single COCs[b] (pCi/g or mg/kg)
Radionuclides	
Am-241	290
Cs-137	23
Eu-152	270
Eu-154	5200
Pu-238	670
Pu-239/240	250
Pu-241	56,000
Sr-90	223
Nonradionuclides[c]	
Mercury (human health)	23

a. Source of risk-based soil remediation goals: Table 2-1 of the OU 3-13 FS. Risk-based remediation goals developed for residential scenario.

b. If multiple contaminants are present, use a *sum of the fractions* to determine the combined COC remediation goal.

c. The mercury remediation goal was selected from the EPA Region 3, April 1996, screening guidance for soil ingestion under the residential scenario.

Table 3-2. SRPA remediation goals (verbatim from DOE-ID [1999]).

Contaminant of Concern	SRPA Remediation Goals (Maximum Contaminant Levels) For Single COCs[a]	Decay Type
Beta-gamma emitting radionuclides	Total of beta-gamma emitting radionuclides shall not exceed 4 mrem/yr effective dose equivalent	Beta-Gamma
Sr-90 and daughters	8 pCi/L	Beta
Tritium	20,000 pCi/L	Beta
I-129	1 pCi/L[b]	Beta-Gamma
Alpha-emitting radionuclides	15 pCi/L total alpha emitting radionuclides	Alpha
Uranium and daughters	15 pCi/L	Alpha
Np-237 and daughters	15 pCi/L	Alpha
Plutonium and daughters	15 pCi/L	Alpha
Am-241 and daughters	15 pCi/L	Alpha
Nonradionuclides		
Chromium	100 μg/L	Not applicable
Mercury	2 μg/L	Not applicable

a. If multiple contaminants are present, use a sum of the fractions to determine the combined COCs remediation goals.

b. Derived concentration if only beta-gamma radionuclide present.

The following RAO was developed to protect human health and the environment:

- Eliminate the threat of release to the SRPA posed by the VES-SFE-20 hot waste tank system.

Section 8.1.7 of the OU 3-13 ROD identified the remediation goals for the SFE-20 tank system as follows:

1. Limit potential external exposures to workers and nonworkers

2. Remove radioactive and hazardous substances remaining in the tank system to prevent potential contaminant releases to the underlying soils or groundwater.

As specified in the ROD, these remediation goals are to be accomplished by

1. Maintaining existing institutional controls to limit current worker and nonworker exposure

2. Removing, excavating, treating, and disposing the SFE-20 hot waste tank system waste and components to eliminate the threat of release to the environment (waste that meets the ICDF WAC will be disposed in the ICDF)

3. Remediating contaminated soils present beneath the SFE-20 tank system that may pose an external exposure risk or threat to groundwater (waste that meets the ICDF WAC will be disposed in the ICDF).

The ROD identifies that these remediation goals also support the "Other Areas RAO 5a" that is "to eliminate the threat of release to the SRPA posed by the SFE-20 Hot Waste Tank System." Also supported is the groundwater RAOs for INTEC-impacted groundwater (located in the groundwater contaminant plume outside of the current INTEC security fence) to restore the aquifer for use by 2095 and beyond so that: (a) risk will not exceed a cumulative carcinogenic risk of 1×10^{-4} for groundwater ingestion; (b) the aquifer will be restored to drinking water quality (below MCLs); and (c) the noncarcinogenic risk will not exceed a total HI of 1 for groundwater ingestion.

Activities being performed by the project to ensure that the remediation goals are met include

1. Planning, designing, and performing work activities in a manner to limit potential external exposures to workers and nonworkers. This includes the implementation of ALARA principles to reduce exposure to workers and the public and eliminate unnecessary exposures.

2. Maintaining existing institutional controls to limit exposures to workers and nonworkers.

3. Removing the SFE-20 tank system.

4. Sampling and assessing soil beneath the tank system to ensure that contaminant levels do not pose an external exposure risk or threat to groundwater. As needed, there will be a reiterative process of soil sampling and assessment for these soils until the remediation goals are met or bedrock is reached (see Section 5.7.2.2, DOE-ID 2003b).

5. Managing waste in accordance with the approved WMP.

3.2 Design Description

The VES-SFE-20 tank system remedial design is divided into two major components. This phased approach allows for removal of the tank and waste, while allowing flexibility in coordinating the removal of the vault and associated structures and soils with other related remedial actions. Phase I and Phase II can be completed sequentially if required.

- **Phase I: Removal of the tank and contents.** Phase I will consist of removing the tank and its content; removing associated piping and asbestos within the excavation area, tank vault, access tunnel, pump pit, and Building CPP-642; and removing loose surface contamination and any liquid from the vault floor and pump pit.

  The Phase I design components include

  - Excavation of soil to designated stockpiles
  - Rerouting of active utilities
  - Cutting and capping of abandoned utilities
  - Accessing tank vault and applying fixative to tank vault

- Removing tank vault roof

- Removing asbestos-containing material within the vault, tunnel, pump pit, and the CPP-642 building

- Removing the tank (with contents) and placement into transportation vessel and/or transfer to staging area for completion of characterization activities, if necessary

- Removing and characterizing loose surface contamination and liquid in vault and pump pit

- Installing precast, reinforced concrete roof over vault

- Backfilling, compacting, contouring, and grading of remediation area.

- **Phase II: Removal of remaining components and vault.** Phase II will consist of removing and disposing of the remaining piping, asbestos-containing material, components, structures and contaminated soil in the ICDF. Phase II will be performed following Phase I completion. The Phase II design components include

  - Installing shoring for deep excavations

  - Excavating contaminated soil to designated stockpiles for sampling

  - Cutting and capping abandoned utility and process lines at the excavation boundary

  - Removing and disposing of abandoned utility and process lines within the excavation boundary

  - Demolishing and removing the concrete structures including the vault, tunnel, pump pit, pipe corridor, and Building CPP-642

  - Installing new masonry wall in pipe corridor

  - Backfilling, compacting, contouring, and grading of remediation area, using locally available, naturally occurring, fill material found at the INEEL, to the extent practicable.

Five Engineering Design Files (EDFs) were developed for the removal of the VES-SFE-20 tank system. Detailed drawings and calculations supporting the design are located in those attachments to this document.

EDF-3282 documents the calculations, sketches, drawings, and diagrams required to support the structural design (Attachment 3). This includes the design for the vault roof removal, tank removal and rigging design, and the design of a precast concrete replacement roof to be placed back on the vault after tank removal.

EDF-3266 documents the underground piping that will be affected by the remediation activities (Attachment 4). The design addresses the rerouting, demolishing, and cutting and capping of each affected line based on the excavation boundary. Active lines will be rerouted in Phase I to eliminate rerouting in Phase II, and abandoned lines will be cut and capped.

EDF-3254 documents the estimated excavation quantities generated for this remedial action (Attachment 5). The Phase I excavation will consist of a sloped excavation of approximately 355 yd^3 of soil. The Phase II excavation will consist of a shored excavation extending to basalt of approximately 1,621 yd^3 of soil.

EDF-3273 documents the calculations for the tank and contents weight, the rational for determining the TRU concentrations levels in the waste package, and the calculations for the TRU concentration level in the waste package and presents the proposed treatment and disposal path (Attachment 6).

EDF-2360 documents the derived concentrations of Am-241 and Np-237 in the tank in relation to the analytically determined Pu concentration obtained from a 1984 sampling event (Attachment 7).

3.3 Design Assumptions

The following section describes the design assumptions under which the RD/RA WP design was developed for the VES-SFE-20 tank system:

- It is assumed that Aquaset or a similar product can absorb any standing water in the pump pit and vault and the resulting waste can be disposed of at the ICDF.

- Any liquid encountered in the piping will be characterized, absorbed, and packaged for disposal.

- The previously observed liquid in the tank is no longer present and only sediment remains. The tank contains no more than 55 gal of sediment material. The tank contents will not be removed. No on-Site treatment of soil or tank sediment is required.

- The tank contents presently have a transuranic concentration of greater than 10 nCi/g.

- The tank contents potentially contain characteristic constituents and may carry listed waste codes upon generation.

- The total polychlorinated biphenyl concentration in the tank sediment is less than 50 ppm, such that no polychlorinated biphenyl waste requirements will apply.

- There will be no criticality concerns associated with the tank contents (see Section 3.9).

- All waste streams, except for the tank and its contents, will meet the ICDF WAC and will be disposed of at the ICDF.

- It is assumed that the vault concrete is in good condition as observed in existing photographs and video inspections and can be removed in one section.

- The subcontractor will provide the final tank and rigging design for removal of the tank.

- Remote operations will not be required. The design approach will use standard industrial tools to remove the tank and appurtenances utilizing temporary/portable shielding to reduce radiation fields.

- The tank is free-resting on tank stands.

- Integrity of the tank is such that tank-rigging operations can be accomplished safely without additional structural reinforcement of the tank.

- The vault roof opening will be smaller than the tank requiring an angled lift. No lifting fixtures are currently attached to the tank.

- Confined space and other health and safety issues can be addressed to allow personnel access to the tank without the use of remote-handling equipment.

- For Phase I, a radiological survey will be used to screen the soil. Soil meeting reuse criteria will be stockpiled for use as backfill, soil not meeting reuse criteria will be segregated into a remediation waste staging pile.

- The Phase II soil that exceeds the RAOs and RGs will be removed from within the shored area and managed as waste. Contaminated soils from releases associated with the SFE-20 system that exceed the RAOs and RGs and that extend beyond the excavation will be removed; other contamination will be documented and evaluated for disposition.

- All piping insulation is assumed to be asbestos-containing material unless sampled and proven otherwise. Phase II activities will not require a containment tent.

- Phase II remediation activities are planned to commence following the closure of VES-SFE-106. If the closure of VES-SFE-106 has not been completed prior to starting the Phase II remediation activities, the remedial design will be modified accordingly to allow the Phase II activities to be completed in accordance with the schedule in this finalized RD/RA WP.

- Basalt depth is approximately 32 ft below ground surface.

3.4 DOE-Related Codes, Standards, and Documents

The following national standards, codes, and regulations; subtier standards, codes, and regulations; and site-specific documents will be used as the basis for the removal of the VES-SFE-20 tank system:

- *Final Record of Decision for the Idaho Nuclear Technology and Engineering Center, OU 3-13 at the Idaho National Engineering and Environmental Laboratory*, DOE/ID-10660, Rev. 0, U.S. Department of Energy Idaho Operations Office, October 1999

- *Remedial Design/Remedial Action Scope of Work for Waste Area Group 3, Operable Unit 3-13*, DOE/ID-10721, Rev. 1, U.S. Department of Energy Idaho Operations Office, February 2000

- *Title I (30%) Remedial Design for the Group 7, VES-SFE-20 Hot Waste Tank*, DOE/ID-11010, Rev. 0, U.S. Department of Energy Idaho Operations Office, September 2002

- *Waste Acceptance Criteria for ICDF Landfill*, DOE/ID-10865, Rev. 2, U.S. Department of Energy Idaho Operations Office, May 2002

- *Remedial Design and Remedial Action Guidance for the Idaho National Engineering Laboratory*, Rev. 1, U.S. Department of Energy Idaho Operations Office

- DOE Order 231.1, "Environmental, Safety and Health Reporting"

- DOE M 232.1A, "Occurrence Reporting and Processing of Operations Information"

- DOE Order 414.1A, "Quality Assurance"
- DOE O 435.1, "Radioactive Waste Management"
- DOE G 440.1A, "Worker Protection Management for DOE Federal and Contractor Employees"
- DOE Order 470.1, "Safeguards and Security Program"
- DOE Order 5400.5, "Radiation Protection of the Public and the Environment"
- DOE Order 5480.4, "Environmental Protection, Safety, and Health Protection Standards"
- DOE-STD-1090-01, "Hoisting and Rigging"
- DOE-ID, *Architectural Engineering Standards*, latest edition.

3.5 INEEL Management Control Procedures

Design activities will be performed in compliance with the applicable MCPs. Current MCPs can be found on the INEEL intranet. Pertinent MCPs for this project are those identifying requirements in the following areas:

- Engineering design
- Emergency preparedness and management
- Fire protection
- Management systems
- Occupational safety and health
- Radiological protection
- Security
- Environmental restoration
- Waste management
- Conduct of maintenance
- Quality.

3.6 Engineering Standards

The construction specifications for each phase will contain references to the latest engineering standards and the specifications to which they apply.

3.7 Plans for Minimizing Environmental and Public Impacts

The remedial action will negate the threats posed by the VES-SFE-20 tank system, which are external exposure and threat of release. This area will be remediated to the standards set forth in the ROD by removing the entire tank system and remediating contaminated soils present beneath the tank system that may pose an exposure risk or threat to the groundwater.

The HASP, included as Attachment 10, provides for the implementation of appropriate health and safety measures to protect workers and the public during the remedial action activities.

3.8 Quality Assurance

The quality program for Environmental Restoration is described in applicable company policies and procedures. Applicable company policies and procedures; the *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites* (DOE-ID 2002a); and this Work Plan govern the functional activities, organizations, and quality assurance/quality control (QA/QC) protocols that will be used for this project. Where applicable, the project specifications (Appendix E, DOE-ID 2002a) give the QA/QC procedures for a given task, consistent with guidance provided in applicable company procedures, and the safety category designation.

The safety category designation is consumer grade. This designation is based upon the auditable safety analysis for the VES-SFE-20 Hot Waste Tank System (ASA-144). This safety category designation will be used for all design and construction activities. A consumer grade safety category corresponds to procurement Quality Level 4 and will be used for all procurement activities.

3.9 Identification of Unresolved Data Needs

Four areas have been identified where unresolved data needs exist. They are criticality safety, hazardous waste characterization, extent of soil contamination, and the packaging and transportation of waste packages. Criticality is not expected to be an issue but will not be known until the completion of the full characterization of the tank sediment. An assessment is in process addressing the hazardous waste characterization for the system. The extent of soil contamination below and around the concrete vault is not known. Lastly, packaging and transportation issues will be resolved following completion of the tank sediment characterization activities.

3.9.1 Criticality Issues

Since the actual characterization data for the tank contents will not be available by the completion of this Work Plan and will possibly affect the criticality safety assessment, a precursory assessment was made as follows based on the 1984 characterization data:

> The minimum critical mass of uranium-235 is 820 grams.[a] With such a mass, the fissile system requires an optimally moderated, homogeneous uranium-water sphere with full water reflection. As the uranium mass is increased, a less idealized system is required for a potential criticality. Samples will be taken of the VES-SFE-20 sediment material and isotopic analysis will determine fissile material content of the tank. If the results of the isotopic analysis indicate a fissile material mass within VES-SFE-20 of 350 grams or less uranium-235 equivalent,

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a. "Critical Dimensions of Systems Containing ^{235}U, ^{239}Pu, and ^{233}U," LA-10860-MS, H. C. Paxton & N. L. Pruvost, July 1987.

> remediation of the VES-SFE-20 waste tank can proceed without further guidance from criticality safety. The potential for an inadvertent criticality within the VES-SFE-20 waste tank is not credible. If the results indicate a fissile material mass of greater than 350 grams ^{235}U equivalent, criticality safety will be notified for further guidance regarding tank remediation. The 350 grams threshold is based on less than 45% of minimum critical and will conservatively incorporate uncertainties associated with the sample analysis. (Stuart 2002)

Upon the receipt of the actual characterization data, the criticality safety assessment will be reevaluated and revised as needed.

3.9.2 Hazardous Waste Issues

As part of the VES-SFE-20 tank system removal, a hazardous waste characterization effort will be performed. For this analysis, the contaminants of concern in the existing VES-SFE-20 tank sediment are dependent upon the tank's operational configuration and historical use. Therefore, an independent assessment of the historical usage of the system is currently being performed. Results from this assessment will be evaluated for impacts to this plan and incorporated as necessary.

3.9.3 Extent of Soil Contamination

The extent of soil contamination around and under the tank vault is currently unknown. During Phase I, sampling will be performed on contaminated soils located above the tank vault as outlined in the Field Sampling Plan (DOE-ID 2003b). This data will be used to assist in the preparation for Phase II activities.

3.9.4 Packaging and Transportation of the Waste Package

Principal criteria for determining the specific requirements for packaging and transportation of the waste package are the radionuclide inventory and the amount of radioactivity, both activity concentration and total activity. This information will be gathered from the results of the sediment characterization. Therefore, upon receipt of the characterization data, the packaging and transportation elements will be reevaluated at that time.

4. REMEDIAL DESIGN

This section describes the remedial design for the VES-SFE-20 tank system, which was developed in accordance with the engineering design basis presented in Section 3.0. The design drawings are included in Attachments 1 and 2. The EDFs describing the design details for the structural, mechanical, and civil components are presented in Attachments 3-5, respectively.

The remedial design will reflect the ROD requirement that the tank system, including contaminated surrounding soils, be removed, treated, and disposed of in an approved disposal facility. Removal of the tank, vault, and other debris will be conducted in two phases. Phase I will consist of removing the tank and its contents, cutting, capping, removal or rerouting of abandoned and active piping, removing asbestos material, removing equipment in Building CPP-642, and removing loose surface contamination and any possible liquids from the vault floor and pump pit. Contamination that is not removed during Phase I will be documented to assist in planning for removal during Phase II if there is a period of inactivity between Phase I completion and initiation of Phase II. If there is a period of inactivity, measures will be implemented to ensure that contamination does not migrate to other media during the interim period. Phase II will consist of removing the piping within the excavation area, removing any remaining equipment, components, structures, and contaminated soil. The following sections summarize the major aspects of the remedial design.

4.1 Phase I - Remedial Design

This section discusses the remedial design for carrying out the activities identified in Phase I. Those activities include removal of the tank and tank contents, cutting, capping, removal and rerouting of piping, removal of asbestos material, removal of the loose surface contamination and liquids from the vault floor and pump pit, resealing the tank vault, and site grading. The following sections address the design process for carrying out the activities identified in Phase I.

4.1.1 Impacted Piping and Electrical Utilities

Building CPP-642 currently acts as a hub for the electrical power and control systems for Buildings CPP-1677 and CPP-648. The excavation around CPP-642 during Phase I and the demolition of CPP-642 during Phase II will require new power and control system circuits to be installed for CPP-1677 and CPP-648 to remain in operation. During Phase I, all electrical devices inside CPP-642 will be abandoned in place, and electrical services to CPP-648 and CPP-1677 will be rerouted; therefore, no further actions will be necessary in Phase II. A new electrical duct bank and conductors will be installed from CPP-603 to CPP-1677 and from CPP-1677 to CPP-648. This new duct bank will be installed outside the boundary of the anticipated excavation. These new circuits will provide power and communications to the various electrical devices in these two buildings.

The numerous abandoned lines located within the remedial work zone will be located, removed, capped, or rerouted as called out in the Construction Drawings – Phase I, Attachment 1. The list of impacted piping within the excavation area for both phases is also shown in Table 4-1. Since different excavation boundaries for the two phases will be used, the lines may be impacted in both phases of the remedial action.

The active high-pressure air line (HAA-104797) will be cut and tied into the rerouted high-pressure line (HAA-105541) to support current operations of Building CPP-648 and also clear the Phase I and II excavation boundaries. Any line encountered that was not identified during the design as shown in this Work Plan shall be identified, evaluated for an operational status, and dealt with as appropriate, with inactive lines being cut and capped. Active lines will be removed and facility drawings will be modified to identify the as-builts.

Table 4-1. Impacted piping for VES-SFE-20 project.

Pipeline	Service	Status as of 11/02	Construction Phase I - Method	Construction Phase II - Method
1-1/2" HSN	High-pressure steam	Abandoned	Cut and cap	Cut and cap
1" CTN	Condensate	Abandoned	Cut and cap	Cut and cap
2" AIR	Air	Abandoned	Cut and cap	Cut and cap
3/4" FWN	Fire water	Abandoned	Cut and cap	Cut and cap
3/4" Drain	Drain	Abandoned	Cut and cap	—[a]
1-1/4" PLA-776	Process waste	Abandoned	Cut and cap	Cut and cap
Drain inlet PLA-100116	Process waste	Abandoned	—	Cut and cap
6" PLA-100380	Process waste	Abandoned	—	Cut and cap
2" PLA-104801	Process waste	Abandoned	—	Cut and cap
3/4" HAA-104797	High-pressure air	Active	Cut and tie into rerouted line	Cut and cap
2" HAA-105541	High-pressure air	Active	Reroute line	Cut and cap
3/4" HSA-104757	High-pressure steam	Abandoned	Cut and cap	Cut and cap
2" NAA-104791	Nitric acid	Abandoned	Cut and cap	Cut and cap
1-1/2" PLA-104804	Process waste	Active; line will be inactive in Phase II	—	Cut and cap

a. "—" = not affected in the construction phase.

4.1.2 Soil Excavation

Soil excavation for the removal of the VES-SFE-20 tank will require use of conventional excavation equipment (e.g., backhoe, trackhoe, front-end loader) and hand-digging. Phase I excavation consists of a sloped excavation to expose the roof of the vault. The excavation will have a horizontal surface adjacent to the concrete roof approximately 1 ft below the top surface of the vault. This will create a working surface along three sides of the vault. From the outer perimeter of the working surface, the excavation will slope up to original grade at 1.5H:1V, see Attachment 5, EDF-3254. The excavation will consist of approximately 355 yd^3 of soil being removed.

As identified in Section 1.6, Phase I is being performed to remove the tank and contents. For worker protection, radiological surveys will be used to screen the soil as it is excavated down to the SFE-20 vault. If the radiological survey identifies a dose rate below the screening level of <5 mrem/hr (or as dictated by the RCT), the soil will be stockpiled for use as backfill material. If radiological readings exceed the screening levels, the soil will be segregated into a remediation waste staging pile and characterized as specified in the Field Sampling Plan (DOE-ID 2003b).

Excavated soil to be reused will be stockpiled adjacent to the excavation in containers or on a geosynthetic impervious liner at least 30 mil thick that will extend at least 5 ft beyond every edge of the soil pile. Liner selection will be based on the compatibility between the liner and the soil. An impervious cover will be used to cover the contaminated soil reuse piles and will extend beyond the bottom liner and be secured to ensure that the soils are not exposed to the wind, precipitation, or elements. Figure 4-1 illustrates the typical configuration of a soil reuse pile. Reuse soil piles containing "clean" soil (defined as up to 100 counts per minute above background) will not be managed in this manner. Following completion of the Phase I activities, the excavation will be backfilled using the soil identified for reuse. If necessary, backfilling will be completed with soil meeting the OU 3-13 reuse criteria. Dust control measures will be employed during all earthwork.

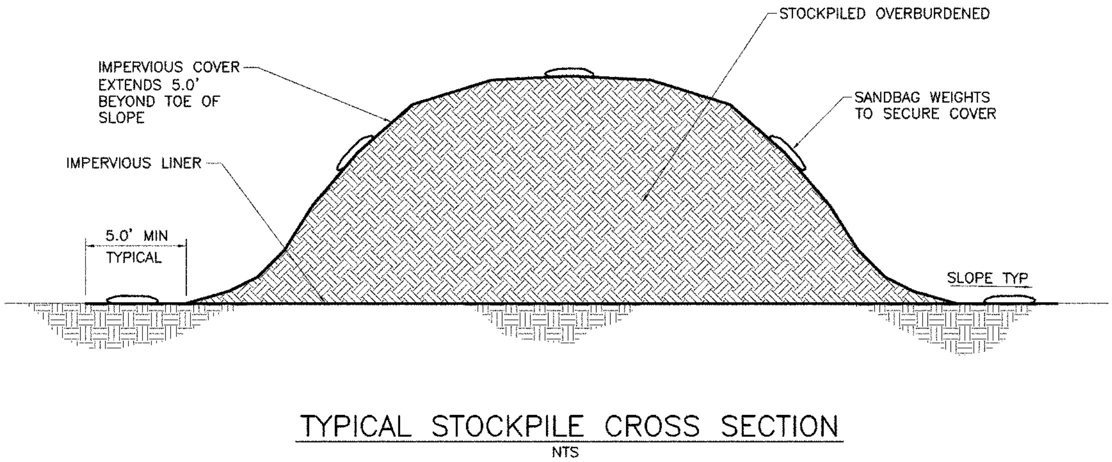

Figure 4-1. Typical soil stockpile design.

4.1.3 Removal of Asbestos, Tank, Contents, and Ancillary Piping

Upon the completion of the excavation activities, the tank along with its contents will be removed from the vault. The removal process will include erecting a containment tent, opening the tank vault, cutting and capping existing lines within the tank vault, hoisting the tank out of the vault, and putting the tank and contents into a transportation vessel and/or moved to a staging area for characterization activities.

4.1.3.1 Containment Tent. A containment tent will be erected over the remediation site encompassing the tank vault and working surface. Clear plastic windows will be located on all sides and the top of the enclosure. The tent will have a zippered door and removable roof cover for more accessibility to the tank and vault during the tank removal process without having to dismantle the entire enclosure. The enclosure will be equipped with a negative pressure HEPA filtration system. Access to the containment tent will be east of the tent as depicted on the excavation drawing.

4.1.3.2 Asbestos Abatement. The asbestos-containing material will be removed from the tank vault, access tunnel, and pump pit during this phase. Asbestos abatement activities have already been completed inside Building CPP-642. The building's roof and the pipe corridor contain asbestos material that will be removed during Phase II.

4.1.3.3 Opening the Tank Vault. The design calls for core drilling a maximum of six, 3-in.-diameter holes into the top of the concrete vault to gain preliminary access into the vault as outlined in Attachment 1, Construction Drawings – Phase I. Through these holes, a fixative will be sprayed to bind any loose contamination present inside the vault. If necessary, absorbents will be added to any water or condensation that may be present. The fixative will be applied to surfaces within the vault, including the floor, and undersides of the tank and roof, piping, valves, and flanges. The fixative paint shall be cured prior to sawcutting the vault roof. This measure will reduce the amount of contamination during sawcutting. After vault roof removal, it may be necessary to apply additional fixative to areas not adequately coated. The roof will be removed by saw cutting with a wet method down to 1/2 to 1 in. of the roof depth. Then a dry cutting method will saw through the last section. During the wet cutting operation, the coolant water will be captured and recycled. In addition, after half the cuts have been made a temporary support beam will be added to the center of the roof slab for support during the remaining cutting process. Due to interferences with an adjacent wall, the vault opening will be smaller than the tank; thus, an angled lift will be required during tank removal. Two support beams will be added for use as rigging spreader beams. The vault roof will be lifted off the structure using an overhead crane.

4.1.3.4 Cutting and Capping Existing Lines within the Tank Vault. The lines leading to the tank will be cut and capped where they enter the vault and the flanges removed at the tank, see Figure 1-4. Blind flanges will then be installed on the tank ports. The lines will be further cut, if necessary, to facilitate tank transport and management. A review of the as-built drawings of the tank system indicated that each line was sloped to allow self-draining into the tank. However, precautions will be made during line removal to contain liquids that may be present. The inactive lines running through the access tunnel, pump pit, and Building CPP-642 will also be removed. Loose debris or materials that hinder tank removal will also be removed as necessary.

4.1.3.5 Hoisting Tank from Vault. The tank will be removed through the space in the roof of the concrete vault. Due to interferences with an adjacent wall, the hole in the roof is slightly smaller than the tank and will require tilting the tank during the lift. An approximate 40 degree angle will allow the tank to pass through the vault opening. The concrete vault in which the tank sets provides little clearance on the sides and ends; thus, the rigging fixtures must be attached from the top of the tank to provide the best control during the angled lift. The analysis in EDF-3282 determined the four pipe flanges would be utilized for the lifting brackets. The lifting brackets are designed to attach to the blank pipe flanges located on the centerline of the tank top. The design used a total weight for the tank, piping, and contents of 2,000 lb (rounded up from calculated weight). Two cranes will be utilized and attached to the rigging fixture to control the tilted lift.

4.1.3.6 Removal of Loose Surface Contamination. Following tank removal, the loose surface contamination in the vault and pump pit will be removed, containerized, and sampled. Conventional methods will be used to perform the removal from the surface areas. A fixative will be reapplied to the tank vault and pump pit floor and 2 ft up the wall prior to vault closure, if necessary. If it is determined that the removal of the loose contamination would impact worker safety and will not be performed during Phase I, the Phase II WP will be revised to reflect this change.

4.1.3.7 ***Characterization of Tank Contents.*** The crane will lift the tank and place it into the appropriate transportation vessel for transfer to a staging area for characterization activities. Sampling will take place through the 6-in. flange located on the top of the tank and will be done in accordance with the current version of the Characterization Work Plan (DOE-ID 2003a). The two bolts holding the flange in place will be removed and the video camera and sampling device will be inserted through the opening. The camera will be used to provide evidence of the collection of representative samples. Depending on the sampling tool, several sample collection runs may be required in order to collect adequate sample volume for the analyses required.

4.1.3.8 Disposal of Tank and Contents. Following the receipt of the characterization results, the transportation vessel, residing on a flat-bed truck, will be closed and secured for shipment off-Site to a treatment and disposal facility. It is assumed that the transportation vessel can either be transported by truck or rail, whichever is deemed the most feasible at the time of remediation. The off-Site facility is subject to compliance with 40 CFR 300.440 requirements and will be subject to an acceptability determination prior to shipment of any waste to the facility.

The disposal options for the tank and its contents were defined in Attachment 6, EDF-3273, and are covered in Section 6.3.4.11 of this report. The EDF provides the TRU concentration levels for each waste certification for the waste package. Two waste certifications are anticipated. The first waste certification is the transfer of the waste package from the INEEL to the treatment facility. The second waste certification is the transfer from the treatment facility to the disposal facility. The calculated TRU concentration limits for each waste package are 23 nCi/g and 4 nCi/g, respectively. The last calculation takes into account the tank is grouted to meet land disposal restrictions (LDRs) and a disposal facility's WAC.

4.1.3.9 Packaging and Transportation. DOE Order 460.1B stipulates that off-Site shipments of waste generated as a result of this remediation must conform to the requirements of the U.S. Department of Transportation's Hazardous Materials Regulation (HMR). In order to determine the precise requirements, the contents to be shipped will be classified with respect to the hazards associated therewith as part of an initial assessment. The data from the 1984 characterization effort were used to help determine if the waste package would meet the activity threshold definition for the various DOT HMR classifications. The two possible DOT HMR classifications for the waste package are LSA-II solids or Type B, nonfissile solids. This tank characterization assessment will be updated based on the characterization that will be performed for the tank contents.

The criterion to differentiate between LSA-II solids and Type B, nonfissile solids is the radiation level of the unshielded material at 3 m. If the radiation level exceeds 1 rem/hr, the limitation for shipping low-specific activity (LSA) is not met. Recent (November 2002) radiation level measurements reported 870 mR/hr at the vent line entry into the tank. Given that the tank diameter is 42 in. (just over 1 m) and that there is no shielding medium between the contents and the point of measurement, it appears that the LSA II criterion is met.

The packaging and transportation requirements are gleaned from the HMR based on the classification of the contents. Each classification will be addressed separately.

<u>LSA-II Solids Packaging Requirements</u> – The authorized packaging types for shipping LSA-II solid contents are

- Industrial Packaging Type 2 (IP-2)
- DOT Specification 7A Type A packaging
- Type B packaging as authorized pursuant to the HMR.

VES-SFE-20 tank size restricts candidates to large-sized packagings. One commercial vendor has three IP-2 packagings that appear to be large enough for the waste package, but this does not take into account any shielding that may be necessary. Another commercial vendor advertises custom Spec 7A Type A packaging capability that is also large enough. Again, the packaging configuration may require ancillary shielding. If the waste package is classified as LSA-II for transportation, then a custom design and fabrication container will be pursued.

<u>Type B, Nonfissile Solids Packaging Requirements</u> – The authorized packaging types for shipping Type B non-fissile solid contents are

- Nuclear Regulatory Commission- (NRC-) approved [11] Type B packagings
- Internationally approved (International Atomic Energy Agency [IAEA]) Type B packagings
- DOT Specification 6M, 20WC, or 21WC packagings.

Only NRC-approved Type B packagings are suitable; the IAEA packagings are for import/export only and the DOT specification packagings are too small.

VES-SFE-20's size again restricts candidates to rather large-sized packagings. The NRC's Directory of Type B packagings reveals only one candidate of sufficient size to accommodate the waste package, that being the Model 6400 (Supertiger) Type B packaging; the inside cavity dimensions are 76 × 76 × 172 in. The largest inner container for the Supertiger, the 'F' container, is 72 × 72 × 168 in. (outside dimensions), which also should be large enough for the VES-SFE-20 to fit inside. However, the Supertiger's list of authorized contents does not clearly include VES-SFE-20. A one-time amendment could be sent to the NRC for their concurrence that specifically describes VES-SFE-20 and that documents it falls within the performance capability of the Supertiger. This type of action is within the purview of the user.

In conclusion, the authorized packaging for LSA-II solids would be one that meets Industrial Packaging Type 2 (IP-2) or Specification 7A Type A requirements, of which there are no 'off-the-shelf' packagings that can accommodate the size, with the shielding factored in. A custom design and fabrication effort to procure a suitable IP-2 or Spec 7A Type A would be necessary.

The authorized packaging for Type B, nonfissile solids would be one that is licensed by the NRC. There is one of sufficient size to accommodate the VES-SFE-20 tank, Model Number 6400 (Supertiger), but its license may not envelop the VES-SFE-20 as authorized contents. If not, then an amendment would be required to specifically add VES-SFE-20 as authorized contents, and perhaps to also include some ancillary shielding capability.

4.1.4 Vault Closure and Site Grading

It is anticipated that there may be a lapse of time before Phase II of the project will be implemented. To keep water and debris out of the vault and return the area to a safe condition, a temporary roof made of precast concrete will be placed over the vault. The precast temporary roof will be sealed to the vault with a joint sealant material to prevent moisture infiltration. The vault replacement roof will be designed to carry the soil weight above the vault. The excavation area will be backfilled with the stockpiled soils for reuse and compacted. Soil identified for reuse will be used if additional fill material is needed. Contouring and grading of backfill excavations will be performed to maintain existing surface water flow patterns at the remediation site.

4.2 Phase II – Remedial Design

This section discusses the remedial design for carrying out the activities identified in Phase II.

4.2.1 Excavation and Shoring

Excavation and removal of the remaining structural components of the tank system will require use of conventional excavation equipment (e.g., backhoes and front-end loaders). Phase II excavation will consist of a shored excavation that is assumed to extend to basalt. Shoring is required due to the numerous existing structures in the area and the overall depth of the excavation. The bottom of the tank vault is in excess of 20 ft below grade. An excavation boundary was selected such that shoring operations must be contained within that boundary (see Attachment 2). The boundary was selected based on a theoretical contamination path starting at the floor of the concrete vault and pump pit and extending down to bedrock at a 1H:1V path (see Figure 4-2). This boundary was used to generate the volumetric quantities for Phase II. The Phase II excavation is 45.5 ft × 32 ft and will consist of approximately 1,620 yd^3 of soil. The construction subcontractor will be responsible for the development of the shoring design.

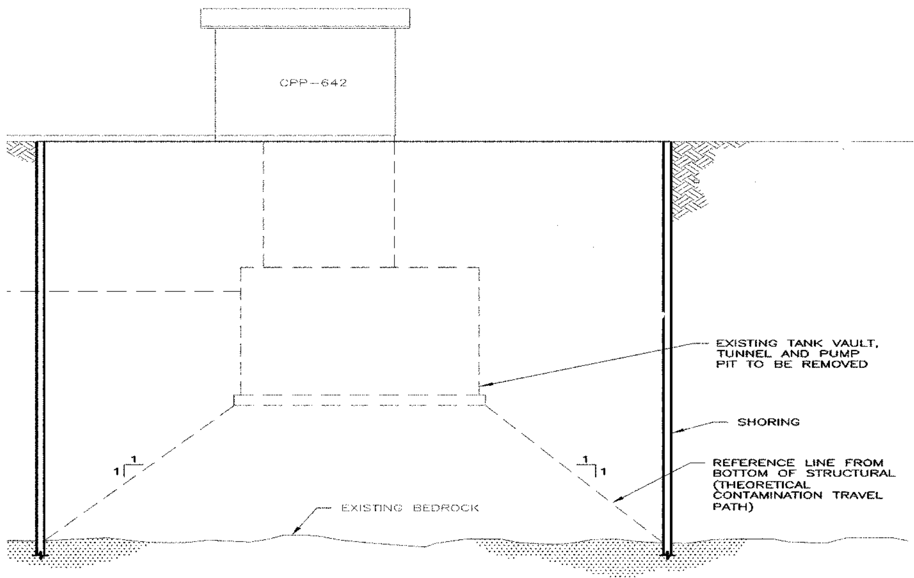

Figure 4-2. Theoretical contamination path below VES-SFE-20 tank vault.

The soil will be stockpiled adjacent to the excavation on an impervious liner. See details of the soil stockpiles under Section 4.1.2.

4.2.2 Cutting and Capping of Utilities

Building CPP-642 is not in operation or service but contains utilities and structures that support adjacent waste holding tanks, which are routed through and adjacent to CPP-642. Active systems were rerouted during Phase I, but numerous abandoned lines cross through the area and interfere with shoring systems and excavation equipment. These lines will be identified, cut, and capped up to the excavation boundary, see Attachment 2, Construction Drawings – Phase II and Attachment 4, EDF-3266. Table 4-1 also lists the lines impacted during this phase.

A pipe corridor supporting CPP-648 (VES-SFE-106) was constructed directly north of the VES-SFE-20 vault. This concrete pipe corridor was doweled into the VES-SFE-20 vault roof and the northwest corner of the CPP-642 pump house. A portion of the corridor sits directly above the north end of the VES-SFE-20 vault. Thus, a portion of the pipe corridor will require removal with the VES-SFE-20 tank vault. Any remaining piping within CPP-642 and piping and equipment in the pipe corridor will be removed during this phase.

4.2.3 Building Removal/Asbestos Removal

Aboveground building removal will consist of the demolition of CPP-642, a single-story structure (13 ft 4 in. × 9 ft 4 in.) constructed of 6-in. concrete block walls and a steel-framed metal deck roof. The roof contains asbestos material and will be removed separately for disposal purposes. The interior components of the building will be disconnected and removed, followed by demolition of the structure and rubble removal. In addition, asbestos material located in the pipe corridor will be removed at this time. Approximately 80 linear feet of piping in the pipe corridor is wrapped with asbestos insulation and is shown on Attachment 2, Drawing P-5.

4.2.4 Underground Structure Removal

The belowgrade structures comprising the VES-SFE-20 tank system will be demolished and removed using conventional demolition equipment and methods. These structures include the CPP-642 foundation and pump pit, access tunnel, and tank vault. The existing pipe corridor will be removed up to the building line of CPP-648. These underground structures are constructed of reinforced concrete. The demolition work will commence from the top down with the abovegrade structures removed first, and, then, as the excavation proceeds, the pump pit, access tunnel, and tank vault will be removed. The existing pipe corridor will be removed by saw-cutting the roof slab, foundation walls, and floor at the building line of CPP-648. A new masonry block wall will be constructed to seal off the belowgrade portion of the building. The remaining pipe corridor can then be removed. It is assumed that the contamination levels will allow the concrete demolition work to be performed by using excavators and demolition equipment to break up the concrete into manageable pieces for removal.

4.2.5 Contaminated Soil Removal

Upon completion of the removal of the VES-SFE tank system and associated structures, the soil underlying the vault will be sampled and removed if soil contamination exceeds the remedial action objectives or remedial goals. Contaminated soils located above the tank vault will not be "chased" outside the soil/shoring interface. If contaminated soil is found above the vault and appears to extend beyond the line of shoring, it will be documented and evaluated for possible inclusion as a FFA/CO new site or possible removal action. Following the completion of the Phase II activities, the excavated site will be backfilled, compacted, and graded using locally available, naturally occurring, fill material found at the INEEL, to the extent practicable.

5. ENVIRONMENTAL COMPLIANCE

This section lists the ARARs for this project. They are discussed below.

5.1 Applicable or Relevant and Appropriate Requirements

The OU 3-13 ROD (DOE-ID 1999) separated the ARARs for the selected remedy for the VES-SFE-20 tank system as follows: (1) "action-specific," (2) "chemical-specific," and (3) "to be considered (TBC)." Table 5-1 summarizes how the substantive requirements of the ARARs and the TBC requirements for the VES-SFE-20 remediation will be met.

Table 5-1. Compliance with ARARs for Group 7, VES-SFE-20, hot waste tank system remediation.

Alternative/ARARs Citation	Description	Relevancy[a]	Compliance Strategy
Action-specific			
IDAPA 58.01.01.650, 58.01.01.651 "Fugitive Dust"	Requirements for dust control during remediation	A	Dust suppression measures will be applied, where required, during implementation of the remedial action to minimize the generation of fugitive dust. These measures may include water sprays, commercial dust suppressants, minimizing vehicle speeds, covering soil piles with tarps and securing the tarps, and work controls during high winds.
IDAPA 58.01.01.585, 58.01.01.586 "Toxic Air Emissions"	Toxic air emissions	A	Phase I activities will remove the tank and contents, asbestos-containing material and contamination, and any liquids in the sump. To control emissions, these activities will be performed in a containment structure with negative pressure and HEPA filtration to control potential emissions from asbestos and other constituents that may be present. Standard asbestos abatement methods to control emissions will be used during asbestos removal, including wetting and spraying with a fixative.
40 CFR 61.92, 61.93 "Emission Monitoring"	Radionuclide emissions from DOE facilities, emissions monitoring, emissions compliance	A	Measures will be implemented to minimize the generation of radionuclide emissions. Measures used to reduce emissions from contaminated soils may include use of water spray, keeping vehicle speeds to a minimum, covering soil piles with tarps and securing the tarps, and work controls during high winds. A containment tent will be erected during implementation of Phase I to reduce radionuclide emissions. To further minimize potential emissions, the tank and contents will be removed intact and transported to an off-Site facility for management/treatment in a controlled environment.
IDAPA 58.01.05.008 [40 CFR 264.193(b)] "Containment and Detection of Releases"	Requirements for hazardous wastes managed in a tank system	NA	Use of tanks at the VES-SFE-20 remediation site for holding or treating remediation wastes is not planned.
IDAPA 58.01.05.008 (40 CFR 264.553) "Temporary Units"	Requirements for storing CERCLA hazardous waste	NA	Use of temporary units for management of wastes is not planned.

Table 5-1. (continued).

Alternative/ARARs Citation	Description	Relevancy[a]	Compliance Strategy
IDAPA 58.01.05.008 (40 CFR 264.554) "Staging Piles"	Establishes the standards for remediation waste staging piles for remediation wastes	A	Staging piles will be used to manage the waste soil piles or filled containers of CERCLA hazardous or mixed (hazardous and radioactive) remediation wastes prior to the transfer of the waste to the ICDF or, if necessary, to an off-Site facility. A staging pile will be in operation for no longer than 2 years. Staging piles will also be used for management of contaminated soils generated during Phase II while awaiting sampling results and a determination of the soil's acceptability for reuse. Staging piles will be sited and managed as identified in this Work Plan.
IDAPA 58.01.05.008 (40 CFR 264 Subpart X) "Miscellaneous Units"	Establishes miscellaneous units for treatment of materials removed from the tank	NA	Use of a miscellaneous unit for the treatment of the tank waste is not anticipated. The tank and contents are planned to be sent, intact, to an off-Site treatment, storage, and disposal facility for management.
IDAPA 58.01.05.011 (40 CFR 268.40[a][b][e]) "Land Disposal Restriction Treatment Standards"	Establishes the LDR treatment standards	A	LDRs will be met for CERCLA hazardous wastes that have triggered placement or are sent to an off-Site facility for disposal. Short-term management of this project's remediation wastes in staging piles will not trigger placement (see ARAR for staging piles).
IDAPA 58.01.05.011 (40 CFR 268.45[a][b][c][d]) "Treatment Standards for Hazardous Debris"	Establishes the treatment standards for hazardous debris	A	The treatment standards for hazardous debris will be met for the CERCLA remediation wastes that have triggered placement or are sent to an off-Site facility for disposal. Short-term management of this project's remediation wastes in staging piles will not trigger placement.
IDAPA 58.01.05.011 (40 CFR 268.49) "Alternative Treatment Standards for Contaminated Soils"	Establishes the alternative LDR treatment standards for contaminated soil	A	The alternative treatment standards for contaminated soils will be met for the CERCLA remediation soils that have triggered placement. Short-term management of this project's remediation wastes in staging piles will not trigger placement.
40 CFR 300.440 "CERCLA Off-Site Policy"	Determination of suitability for off-Site treatment, storage, and disposal facilities	A	Any off-Site facility receiving CERCLA wastes will be subject to compliance with 40 CFR 300.440 requirements. Prior to shipment of any CERCLA remediation wastes to an off-Site facility, DOE will provide the Agencies with the facility's acceptability determination.
Chemical-specific ARARs			
IDAPA 58.01.05.005 (40 CFR 261.20 through 24) "Characteristics of Hazardous Waste"	Hazardous waste characteristics identification	A	Hazardous liquids or sediments in the tank system or underlying soils that may have been impacted by a release will be assessed. The applicable waste streams will be characterized in accordance with the Field Sampling Plan (DOE-ID 2003b), RD/RA WMP (DOE-ID 2003c), and the Characterization WP (DOE-ID 2003a).
IDAPA 58.01.05.006 (40 CFR 262.11) "Hazardous Waste Determination"	Hazardous waste determination for wastes	A	Hazardous waste determinations will be performed on all waste streams generated during remediation as specified in the WMP.

Table 5-1. (continued).

Alternative/ARARs Citation	Description	Relevancy[a]	Compliance Strategy
40 CFR 61 Subpart M, 61.145, 61.150; 61.156 "Asbestos Regulations"	Establishes asbestos regulations for the safe handling of asbestos-containing materials	A	Asbestos-contaminated waste streams will be removed and transported in accordance with INEEL MCPs for asbestos. This establishes the requirements for removal/collection, containerizing, and transportation. Disposal will be performed in accordance with the WMP.
To Be Considered			
DOE Order 435.1 "Radioactive Waste Management"	Radioactive waste management performance objectives to protect workers	TBC	Dose to workers will be reduced through the use of monitoring, administrative, and engineering controls. Job safety analyses and/or radiological work permits will be prepared for tasks where there is the potential for exposures to radioactive contamination/materials. Radiological work permits will be used only as determined by the RCT, based on the applicable company manuals.
DOE Order 5400.5, Chapter II (1)(a,b)	Establishes radiation protection standards and controls to limit the effective dose to the public.	TBC	Specific radiation dose limits to the public will be met through monitoring, administrative, and engineering controls as required during excavation and construction in contaminated areas.

a. A = Applicable; NA = Not Applicable.

6. REMEDIAL ACTION WORK PLAN

This section describes the management and implementation approach for remediation of the VES-SFE-20 tank system, the work elements of the retrieval process, the associated schedule, and the documentation required to complete the work and to document its completion. As the remedial design and remedial action are combined into one document for this project, some details of the implementation have already been described in the design sections of this document.

6.1 Relevant Changes to the RD/RA SOW

The RD/RA SOW depicts the VES-SFE-20 implementation phase as a single-phase removal project. This document describes the current approach as two separate phases of removal activities. Phase I consists of removing the tank and its contents; removing piping within the excavation area, access tunnel, pump pit, and Building CPP-642; removing asbestos insulation; and removing loose surface contamination and liquids on the vault and pump pit surfaces. Phase II consists of removing the remaining tank system, components, structures, and contaminated soil for disposal in accordance with the WMP.

6.2 Remediation Implementation Plan

The work elements composing this remedial action consist primarily of earthwork, including excavation of soils above and around the VES-SFE-20 vault, rerouting and demolition of utility lines, demolition of structures, asbestos abatement, and hoisting and rigging for removal of the VES-SFE-20 tank.

The design of this remedial action allows for the work to be done either by INEEL personnel or a subcontractor. For the purpose of this plan it is assumed that all of the work described in this document is planned to be competitively bid and awarded as a firm, fixed price subcontract. INEEL's procurement process will be followed and will include, but is not limited to, issuance of a Request for Proposal (RFP), prebid conference, bid evaluation, notice of award, notice to proceed, vendor data submittals, and a pre-construction kickoff meeting. The work elements described in this Work Plan may be performed under a single subcontract or several subcontracts. Site force account personnel may perform a portion of this work, if necessary. Both subcontract and site personnel may be required to perform to the schedule outlined in Appendix A in order to meet the overall project schedule and objectives.

6.3 Remedial Action Work Elements

The following sections identify the work elements required to implement and complete the VES-SFE-20 tank system Phase I and Phase II remediation. Additional detail can be found in the project design drawings. All work will be done in accordance with the approved HASP for the VES-SFE-20 Hot Waste Tank (INEEL 2003) and this Work Plan. Modifications to this Work Plan will follow the procedure outlined in Section VIII, Subsection J of the FFA/CO for modifications to a Final Primary Document.

6.3.1 Premobilization

Requirements for vendor data submittals, training, and medical information specified by the construction specifications and INEEL-specific requirements will be provided in the RFP. The subcontractor will provide all required documentation, bonds, and insurance, and proof that all required training and medical examinations are complete as per the project-specific HASP (INEEL 2003) before the subcontractor will be allowed to mobilize. These submittals will certify that the subcontractor can meet and satisfy the requirements of the RFP and the project.

6.3.2 Mobilization

Mobilization is the work performed in preparation for construction activities. This work generally implements the project and site required administrative, engineering, and health and safety controls. Mobilization will include such activities as setup of site offices; demarcation of parking areas, equipment and material lay down areas, and work zones; and installation of signs, postings, and fences. Generally, the VES-SFE-20 remedial action activities will be performed inside the INTEC facility fence. Required lay down areas, work zones, and postings will be set up and maintained for each phase of the remediation. Coordination of the remediation activities will be required between contractor, subcontractor, and facility personnel to ensure that these activities have minimal impact on facility operations and maintenance.

6.3.3 Construction Surveying and Staking

Surveying and staking will be performed to establish the horizontal and vertical location of all underground piping and utilities capped, relocated, or otherwise identified during the construction. In addition, any structures or other obstructions uncovered but not identified on the drawings shall also be located. Surveying activities will be performed under the supervision of a qualified surveyor.

6.3.4 Remediation of Tank and Contents (Phase I)

The VES-SFE-20 tank and contents will be removed in Phase I of the remedial action. This section discusses the work elements required for completing this initial phase of the remedial action. Phase I work elements include (1) sediment characterization sampling, (2) rerouting of the active utility line identified in the design, (3) cutting and capping of abandoned utility lines, (4) excavation activities, (5) asbestos abatement activities, (6) tank removal including removal of loose surface contamination and any liquid from vault and pump pit surfaces, (7) tank and sediment disposition, and (8) temporary closure of vault and excavation. The following sections provide a summary of each of these work elements.

6.3.4.1 Characterization Sampling. . This sediment sampling effort will be performed in accordance with the current version of the Characterization Work Plan (DOE-ID 2003a). During this time, the tank will be managed in a controlled environment to protect the workers and the environment and to shield the tank from exposure to wind, precipitation, or elements. If a separate structure/tent is required for the sampling and staging of the tank, details on the siting and configuration will be provided.

6.3.4.2 Rerouting and Demolition of Existing Utilities in Excavation Area. Past operations in the area around the VES-SFE-20 tank utilized electrical, steam, water, and other process lines. These utility lines are either active and in use supporting existing INTEC operations or are inactive and abandoned. The active and abandoned lines that are within the excavation zone or within the VES-SFE-20 tank vault are identified in Attachment 1, Construction Drawings – VES-SFE-20 Hot Waste Tank Remedial Design – Phase I. Inactive lines will be cut and capped while one active line will be re-routed to support current operations. Cutting and capping of the abandoned lines and rerouting of the active line will be done in accordance with the approved INEEL procedures.

During Phase I, all electrical devices inside CPP-642 will be abandoned in place, and active electrical services to CPP-648 and CPP-1677 will be rerouted. Building CPP-642 currently acts as a hub for the electrical power and control systems for Buildings CPP-1677 and CPP-648. The excavation around CPP-642 during Phase I and the demolition of CPP-642 during Phase II will require new power and control system circuits to be installed for CPP-1677 and CPP-648 to remain in operation. During Phase I, all electrical devices inside CPP-642 will be abandoned in place, and electrical services to

CPP-648 and CPP-1677 will be rerouted; therefore, no further actions will be necessary in Phase II. A new electrical duct bank and conductors will be installed from CPP-603 to CPP-1677 and from CPP-1677 to CPP-648. This new duct bank will be installed outside the boundary of the anticipated excavation. These new circuits will provide power and communications to the various electrical devices in these two buildings.

The numerous abandoned lines located within the remedial work zone will be located, removed, capped, or rerouted as called out in the Phase 1 Construction Drawings. The list of impacted piping in Phase 1 is shown in Table 4-1. The one active high-pressure air line (HAA-104797) will be cut and tied into the re-routed into the high-pressure line (HAA-105541) to support current operations of Building CPP-648 and also clear the Phase I and II excavation boundaries.

When utility lines are encountered that are not indicated on the drawings, the contractor's representative shall be notified prior to further work in that area. Waste generated will be managed as CERCLA waste in accordance with the Waste Management Plan (DOE-ID 2003c).

6.3.4.3 Excavation, Sloping, and Soil Disposal. Phase I earthwork will consist of a sloped excavation to expose the roof of the VES-SFE-20 vault. The sides of all excavations will be sloped in accordance with OSHA 29, CFR 1926, Subpart P and the SRM. A competent person will inspect the excavation in accordance with OSHA 29, CFR 1926, Subpart P and the SRM. A stairway, ladder, ramp, or other safe means of egress will be located as identified on the design drawings.

The vault roof is approximately 10 ft below surface grade. The excavation will extend approximately 1 ft below the surface of the vault roof to provide the access required to cut and remove the roof. Approximately 355 yd^3 of soil will be removed during the Phase I excavation. The soil meeting OU 3-13 reuse criteria during Phase I will be stockpiled or containerized adjacent to the excavation (see Figure 6-1) and will be returned to the pit following tank removal and replacement of the vault roof. See Section 4.1.2 for information on the management of the soil. Soils not meeting the "reuse" criteria will be segregated into a remediation waste staging pile and characterized for disposal in accordance with this Work Plan.

6.3.4.4 Containment Tent. Upon completion of the excavation activities, a containment tent with removable top will be erected over the vault. The tent will serve a dual purpose, radioactive contamination containment and asbestos particle containment during asbestos abatement activities. The enclosure will be equipped with a negative-pressure HEPA filtration system. Any ancillary equipment for the remediation activities will be stored within the enclosure as space is available.

6.3.4.5 Contaminant Fixation. Prior to removal of the vault roof, holes will be core-drilled through the 8-in. concrete roof and a coating of paint will be spray-applied as a contamination control measure to encapsulate and fix any loose radiological contamination. All paint will be applied in accordance with the manufacturer's instructions using the necessary tools, extensions, sprayers, and nozzles. The paint will coat all surfaces and objects within the vault (excluding access tunnel). This will be verified by visual inspection through the access holes using cameras and other remote means. Additional paint may be required at this time to complete the coating process.

The fixative paint will be an acrylic-latex enamel. The paint will be well ground, shall not settle excessively, cake or thicken in the container; shall be readily broken up with paddle to a smooth consistency. Solids by volume will be not less than 30%.

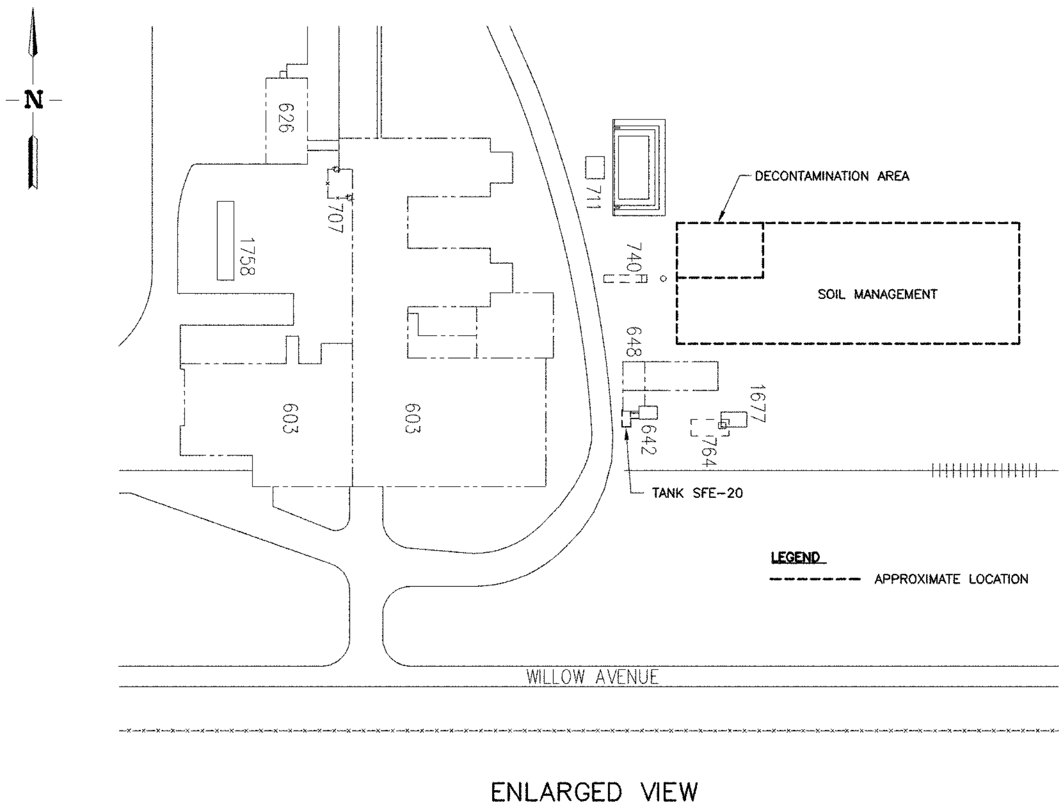

Figure 6-1. Location of soil management/decontamination area for VES-SFE-20 project.

6.3.4.6 Removal of Vault Roof. Following fixation of contamination inside the vault, the vault roof will be cut and removed. The roof will be removed by saw cutting with a wet method down to 1/2 to 1 in. of the roof depth. Then a dry cutting method will saw through the last section. During the wet cutting operation, the coolant water will be captured and recycled. Water usage will be controlled during the saw cutting operation to prevent water from entering the vault and flooding the work area. After half the cuts have been made a temporary support beam will be added to the center of the roof slab for support during the remaining cutting process. Two support beams will be added for use as rigging spreader beams. The vault roof will be lifted off the structure using an overhead crane. The vault roof will be disposed of in accordance with the WMP (DOE-ID 2003c).

The contamination control enclosure with a removable top will be utilized during the removal of the vault lid and will be opened as needed to allow extraction of the tank and associated piping.

6.3.4.7 Cutting and Capping Existing Lines within the Tank Vault. Prior to extraction of the tank, the lines leading to the tank will be cut and capped where they enter the vault and the flanges removed at the tank (see Figure 1-4). Blind flanges will then be installed on the tank ports. The lines will be further cut, if necessary, for disposal purposes. The inactive lines running through the access tunnel, pump pit, and Building CPP-642 will also be removed. Precautions will be made when cutting, removing, or managing piping to containerize any liquids that may be present. Precautions may include, but not be limited to, placing a container or impermeable barrier (e.g., hypalon) beneath the pipe to capture potential liquids that might be released. Following absorption of the liquids, all the remediation waste will be characterized as required by the WMP (DOE-ID 2003c).

6.3.4.8 Hoisting Tank from Vault. The tank will be removed through the space in the roof of the concrete vault and will require tilting the tank during the lift. An approximate 40 degree angle will allow the tank to pass through the vault opening. The concrete vault in which the tank sets provides little clearance on the sides and ends; thus, the rigging fixtures must be attached from the top of the tank to provide the best control during the angled lift. Two cranes will be utilized and attached to the rigging fixture to control the tilted lift.

6.3.4.9 Asbestos Abatement. Asbestos abatement will consist of removing asbestos or asbestos-containing material (ACM) associated with Phase I activities and controlling the spread of asbestos fibers or contamination of surrounding facilities, environment, or personnel as a result of the Subcontractor's activities. Work includes, but is not limited to, providing isolation, barriers, or other means to control the spread of asbestos and removing and disposing of asbestos or ACM as identified on the drawings.

As ACM is removed, it will be containerized in accordance with asbestos requirements, the WAC of the disposal facility, and the WMP (DOE-ID 2003c).

Cleanup of all surfaces in the work area and any other contaminated areas will be performed with wet cleaning methods or with HEPA vacuum equipment. All equipment used in the work area will be removed through the decontamination enclosure system, if required, at an appropriate time during the cleaning sequence.

Following cleaning, a visual inspection will be conducted under the guidelines of ASTM E1368, followed by application of a lockdown encapsulant to the polyethylene sheeting and all surfaces which have had ACM removed as needed. Any HEPA filtration systems and decontamination systems will remain in service.

6.3.4.10 Surface Contamination Removal and Remaining Surface Contamination Fixation. Removal of large, loose, or visible contamination from the vault floor and pump pit floor will take place following the removal of the tank and identified piping. Cleanup activities on the vault floor will remove all sediment fixed in-place by the paint fixative applied prior to tank removal. Contamination and sediment removal will require the use of shovels, scrapers, or similar tools. Prior to contamination removal from within the pump pit, all liquid (if present) will be absorbed, containerized, and characterized.

Following contamination removal operations, a visual inspection will be performed in the area to determine if all contamination has been removed. Loose contamination will be disposed of in accordance with the WMP (DOE-ID 2003c). Contamination left in place for removal in Phase II will be appropriately documented.

A final coating of paint shall be applied to the remaining vault concrete walls, floor, and roof as described in Section 6.3.4.5. The final coating shall provide an overall accumulated dry film thickness of 2 mils.

6.3.4.11 Disposal of Tank and Contents. The crane will lift the tank and place it into the appropriate transportation vessel. Once in the transportation vessel, the vessel will be closed and secured for shipment off-Site to a treatment and disposal facility. The off-Site facility is subject to compliance with 40 CFR 300.440 requirements.

The anticipated waste streams as a result of this remedial action are the VES-SFE-20 tank containing approximately 33 gal of contaminated sediment, ancillary piping, contaminated sediment, soil and miscellaneous supplies resulting from removal of surface contamination on vault surfaces, and asbestos debris from asbestos abatement activities.

An EDF-3273, "TRU Constituent Calculations and the Proposed Disposal Path for the VES-SFE-20 Hot Waste Tank and Contents," was developed to analyze the TRU concentration levels within the waste package and the treatment and disposal options for the waste package based on the following assumptions:

- Tank contains a hazardous constituent and tank does not contain a hazardous constituent (i.e., characteristic or listed)
- Tank sediment has a TRU concentration of 117 nCi/g (EDF-2360)
- Tank and the sediment are one waste package.

Two waste certifications will be necessary for this waste package. Guidance found in DOE G 435.1-1 dictates that "the determination of transuranic waste should be made at the time of waste certification, that is, each time the waste is transferred to another person or facility." The first waste certification will be when the waste package is transferred from the INEEL to a treatment facility and will have a TRU concentration limit of 23 nCi/g. A second waste transfer will occur from the treatment facility to the disposal facility and have a TRU concentration limit of 4 nCi/g. Detailed calculations supporting the TRU concentration levels for each waste package are contained in Attachment 6, EDF-3273.

Guidance for determining concentrations of radioactive waste is found in the NRC's *Issuance of Final Branch Technical Position on Concentration Averaging and Encapsulation, Revision in Part to Waste Classification Technical Position* (NRC 1995):

> A tank contains a radioactive heel. If the heel will not be removed but is to remain with the tank structure for disposal, then the mass of the tank structure and the heel may be added together to determine the concentration of radionuclides in the waste. The void spaces must be eliminated (e.g., crush or grout in the tank) before the waste is disposed. If the heel is to be removed separately, then the heel must be classified separately from the tank structure.

In accordance with the guidance, the waste package is the tank and a radioactive heel. The heel will not be removed, but will remain with the tank structure for disposal due to the increased risk to the health and safety of workers if the heel was to be removed. Therefore, the waste package will be disposed as one unit and the mass of the tank structure and the heel will be added together to determine the concentration of TRUs in the waste package. Detailed calculations supporting the TRU concentration levels for each waste package are contained in Attachment 6, EDF-3273.

6.3.4.11.1 Proposed Disposal Path for Waste Package—Two proposed pathways are designated for the initial waste package; one for a RCRA-regulated waste; and one for a non-RCRA regulated waste. The waste is assumed to be contact-handled waste. Figure 6-2 identifies the treatment, storage, and disposal scenarios for various waste configurations. Since the actual characterization information is not available at this time, the figure was developed to outline a path forward for the waste package and analyze the feasibility of each path. The current treatment and disposal facilities are identified for each waste scenario.

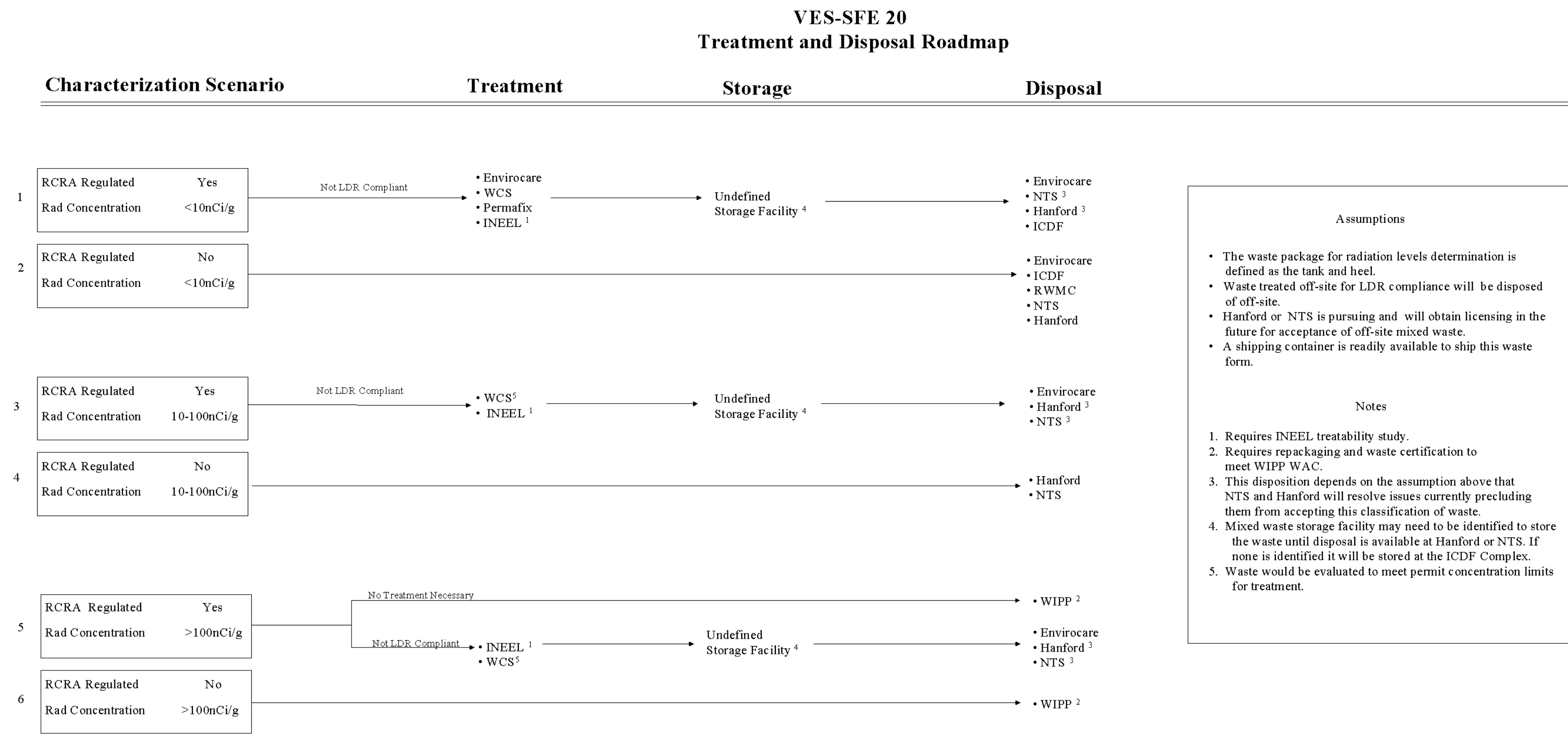

Figure 6-2. VES-SFE-20 waste package treatment and disposal roadmap.

6.3.4.11.2 RCRA-Regulated CERCLA Waste—As is shown in the figure, a RCRA-regulated waste with a TRU concentration level of 23 nCi/g (Box 3) would require treatment to meet LDRs and a disposal facility's requirements. The options for treating to meet LDRs are on-Site treatment (i.e., stabilization with grout) or off-Site treatment at an approved facility. One treatment facility that has been identified for the treatment of the waste package is Waste Control Specialists (WCS) of Texas. This company has the capability to grout the tank resulting in a waste form that will meet LDRs and the designated disposal facility's WAC. Another option is a permitted in-container process whose end result is a glass product. This option has been identified if the actual characterization data results show the VOC constituents are too high for the grouting method.

On-Site treatment was also looked at. Assurance that stabilization efforts would uniformly mix the grout with the sediment was low based on the INEEL's current resources in this area. Treatability and development efforts would have to be undertaken to pursue this path.

Since actual characterization data are not available as this time, the decision on a specific treatment technology will have to be made prior to actual remediation efforts; however, based on the limited 1984 characterization data, and worker safety, the proposed path of off-Site grouting to meet LDRs was deemed the "most probable" and cost-effective option. In addition, this option fully meets the requirement in the ROD to remove and treat the waste off-Site.

For disposal options, the second waste certification calculations are used. This is the transfer of the treated waste package from the treatment facility to the disposal facility. The treated waste package would have a TRU constituent level of 4 nCi/g. The disposal options, from Box 1, are Envirocare, Hanford, Nevada Test Site (NTS), and the ICDF. At the present time, Hanford and Nevada cannot accept off-Site mixed waste but are pursuing licensing for future acceptance. The ICDF is not a feasible option based on conditions in the OU 3-13 ROD stating the "as found" sediment in the tank had to be <10 nCi/g (1984 data showed the sediment is 117 nCi/g [EDF-2360]). Therefore, based on current assumptions and conditions, Envirocare is the proposed disposal facility. In reviewing their WAC (Appendix B in Attachment 6), they are able to handle debris and dispose of a RCRA-regulated waste form. Additionally, Envirocare has experience disposing of tanks. It shall be noted again that when actual characterization data are obtained, revisions to the current assumptions and conditions of the waste package will be made as appropriate.

6.3.4.11.3 Non-RCRA-Regulated CERCLA Waste—From Figure 6-2, a non-RCRA-regulated CERCLA waste with a TRU concentration level of 23 nCi/g (Box 4) could go directly to an approved disposal facility if the waste package meets their WAC. The disposal facility options listed include Hanford and NTS. One criterion that would have to be achieved is to reduce the void space within the waste to the extent possible (DOE M 435.1-1, Chapter IV, G.1.d.2) and achieve long-term stability. In order to do this, the remaining space in the tank, approximately 604 gal, would be filled with grout, resulting in the waste package having a new TRU concentration level of 4 nCi/g. WCS has the capability to grout the tank and the disposal path is then outlined in Box 2. Disposal options listed include Envirocare, ICDF, Radioactive Waste Management Complex (RWMC), NTS, and Hanford. ICDF is not a feasible option due to the ROD constraint. RWMC is an on-Site disposal facility option; however, the current operating schedule identifies closure of this facility prior to the planned remediation of the VES-SFE-20 project. Lastly, NTS and Hanford have size constraints. Envirocare is still the viable option for the grouted tank. Given this, the route outlined is transferring the waste package from the INEEL to WCS for grouting, then transferring the waste package to Envirocare for disposal.

The VES-SFE-20 tank and sediment will be packaged per EDF-3345, "Packaging and Transportation Evaluation for VES-SFE-20 Waste Tank," for shipment to a waste treatment and disposal facility.

Other piping and debris will be disposed of in the ICDF as allowed by the ICDF Landfill Waste Acceptance Criteria (DOE-ID 2002b). The WMP for the VES-SFE-20 Hot Waste Tank System (DOE-ID 2003c) provides additional details regarding treatment and disposal of the various waste streams resulting from the Phase I remedial action.

6.3.4.12 Temporary Vault Closure, Backfilling, and Site Grading. It is anticipated that there will be a lapse of time before Phase II of the project will be implemented. To keep water out of the vault and return the area to a safe condition, a temporary roof made of precast concrete will be placed over the vault and the excavation will be backfilled and compacted. The precast temporary roof will be sealed to the vault with a joint sealant material to prevent moisture infiltration (see Drawing S-4 in Attachment 1).

Concentrated dumping of backfill or fill material into excavations will not be permitted. No water will be used for placing, settling, or compacting backfill or fill except to obtain optimum moisture content. All material must be placed in uniform layers not to exceed 8 in. loose measurement and brought up simultaneously and evenly on both sides of foundation walls and around underground or covered structures and equipment such as culverts, manholes, storage tanks, and pipe. Backfill or fill around piping, and at least 4 in. over, will be hand-placed and compacted prior to pressure testing. Pipe joints shall be left exposed until leak testing has been completed.

Unless otherwise indicated, all backfill and fill material will be compacted to at least 4 in. compacted depth above all piping in trenches. Unless otherwise indicated, all "compacted" backfill or fill shall be compacted to at least 95% of maximum density at optimum moisture content as determined by AASHTO T99. Unless otherwise noted, loose measurement lifts shall be 8 in. maximum. Each lift shall be compacted before the next lift is placed thereon. No heavy equipment shall be allowed within 5 ft of a structure or the foundation of any structure or allowed over piping until a minimum of 24 in. of backfill has been compacted over the piping.

The backfill material will be soils that were removed and stockpiled, during the initial excavation. Soil designated for reuse will be applied to the surface if required to return the site to its pre-remediation state. Contouring and grading of backfill excavations will be performed to maintain existing surface water flow patterns at the remediation site. Because this remediation will not affect any vegetated areas, no seeding or vegetation activities will be required. Gravel fill will be replaced to return the site to its preremediation state.

6.3.5 Remediation of Equipment, Structures, and Contaminated Soil (Phase II)

Phase II remediation will include remediation of the remaining process equipment and contaminated soil and demolition and removal of the remaining related structures. This section provides the work elements required to complete the Phase II remediation activities.

6.3.5.1 Excavation and Shoring. Phase II excavation will consist of a shored excavation that is assumed to extend to the basalt bedrock as shown in the Phase II Construction Drawings. A shored excavation is required due to the numerous structures in the area and the overall depth (in excess of 30 ft) of the excavation. The sides of all excavations shall be shored or braced in accordance with OSHA 29, CFR 1926, Subpart P and the SRM. The excavation will be inspected by a competent person in accordance with OSHA 29, CFR 1926, Subpart P and the SRM.

Soil meeting CERCLA reuse criteria will be stockpiled on an impervious liner in the same area as provided in Phase I (see Figure 6-1). See Section 4.2.5 for information on the management of soil.

6.3.5.2 Cutting and Capping of Existing Utility Lines. Existing utility lines in Building CPP-642 include active air and power distribution to CPP-1677 (VES-SFE-126) and CPP-648

(VES-SFE-106). All active systems were rerouted during Phase I. However, numerous abandoned process lines cross through the area, which pose interference for shoring systems and excavation equipment. These lines will be identified, cut, and capped as appropriate at the excavation area boundary.

A concrete pipe corridor containing utilities that support CPP-648 (VES-SFE-106) is situated directly north of the VES-SFE-20 vault. This corridor is attached to the VES-SFE-20 vault roof and the northwest corner of the CPP-642 pump house, and a portion of the corridor is situated directly above the north end of the VES-SFE-20 vault. In addition, abandoned sample lines running from the CPP-648 pump house and entering the north side of the VES-SFE-20 vault are located beneath this corridor. Thus, a portion of the pipe corridor (up to the building line of CPP-648) and the abandoned lines running below the corridor will require removal with the VES-SFE-20 tank vault. The portion of the existing concrete corridor that is to be removed will be removed by cutting neat lines around the perimeter of the area. The neat lines will be a saw cut score at least 1 in. deep in floors and at least 1 in. deep on both sides of walls. The remaining depth of the concrete at the score lines and the concrete to be replaced will be broken by approved methods. The portion of the facility to remain shall be protected against damage during the pipe corridor removal.

When utility lines are encountered that are not indicated on the drawings, the contractor's representative shall be notified prior to further work in that area. Waste generated will be managed as CERCLA waste in accordance with the WMP (DOE-ID 2003c).

6.3.5.3 Asbestos Abatement. Asbestos abatement will consist of removing ACM from the roof of Building CPP-642 and the pipe corridor. Work includes, but is not limited to, providing isolation, barriers, or other means to control the spread of asbestos and removing and disposing of asbestos or ACM as identified in the drawings.

6.3.5.4 Building Removal. The demolition work will commence from the top down with the abovegrade structures removed first, followed by removal of the pump pit. The access tunnel and tank vault will be removed as described in the following section. CPP-642 with all related piping and instrumentation will be removed under this phase of the VES-SFE-20 remediation. Piping, utilities, and instrumentation supporting CPP-642 will be removed prior to demolition of the structure. Asbestos abatement activities will be performed for the roof structure of CPP-642. Asbestos abatement has been previously completed inside this building and therefore is not required prior to demolition. All rubble and other construction debris resulting from this demolition will be characterized and disposed of at the ICDF per the WMP (DOE-ID 2003c).

6.3.5.5 Underground Structure Removal. The underground concrete structure consists of the VES-SFE-20 tank vault, access tunnel, pipe corridor, and associated pump pit. The pipe corridor will require saw cutting for removal from the existing building line of CPP-648. A new masonry block wall will be constructed to seal off the belowgrade portion of the building. The remaining identified structures will be demolished in place using conventional demolition equipment and methods. All rubble and other construction debris resulting from the underground structure demolition and removal will be characterized and disposed of according to the WMP (DOE-ID 2003c). It is assumed that the contamination levels will allow the concrete demolition work to be performed by using excavators and processors to break up the concrete into manageable pieces for removal and disposal at the ICDF.

6.3.5.6 Contaminated Soil Removal. Following removal of the structures described above, the underlying soil will be sampled as directed in the Field Sampling Plan for the VES-SFE-20 Hot Waste Tank System at INTEC (DOE-ID 2003b). If the soil below the vault is contaminated, it will be removed and disposed of in the ICDF. See Section 4.2.5 for specifics on contaminated soil removal and management.

6.3.5.7 Disposal of Equipment, Structures, and Contaminated Soil. The contaminated soil from the Phase II remediation activities will be characterized and managed in accordance with the WMP (DOE-ID 2003c). Demolished structures as well as any disposable process equipment will be sampled to assure compliance with the ICDF WAC and will then be disposed of at the ICDF.

6.3.6 Dust Control

The amount of dust resulting from remedial action activities shall be controlled to prevent the spread of dust to occupied portions of the construction site and to avoid creation of a nuisance in the surrounding area. Precautions such as water spray, wind monitoring, and/or visual observation will be used during any earthmoving activities to prevent the generation of fugitive dust. Use of water will not be permitted when it will result in, or create, hazardous or objectionable conditions such as ice, flooding, and pollution. Air monitoring may be performed at the discretion of the RCT or the IH based on their evaluation of the effectiveness of the dust suppression measures to control the spread of contamination through fugitive dust. Personal protective equipment, when required, shall be used as specified in the project-specific HASP and as determined by the RCT or IH present at the job site.

6.3.7 Site Reclamation

Upon completion of Phase II activities, reclamation of the work sites shall be performed, including areas adjacent to any barriers disturbed during construction, lay down areas, and all areas affected by road work and borrow and stockpiling activities. Because this remediation will not affect any vegetated areas, no seeding or vegetation activities will be required. Fill material will be used to return the site to its pre-remediation state in accordance with INEEL guidelines.

6.3.7.1 Demobilization. Following completion of Phase II remediation activities and decontamination of equipment, the subcontractor will demobilize from the site. The subcontractor will remove any office trailers and associated ancillary equipment from the site. Temporary fencing and signage, and a decontamination pad, if used, will be removed and disposed of appropriately in accordance with the WMP.

6.4 Field Oversight/Construction Management

The DOE-ID remediation project manager will be responsible for notifying the EPA and IDEQ of major project activities (e.g., project startup or closeout) and other project activities, as deemed appropriate. DOE-ID will serve as the single interface point for all routine contact between the EPA and IDEQ and the INEEL RD/RA contractor.

INEEL personnel are responsible for field oversight and construction management services for this project and will provide field support for health and safety, quality assurance, and landlord services. A project organization chart and associated position descriptions are provided in the project-specific HASP (INEEL 2003).

Visitors to the project site who wish to observe the Phase I or Phase II remediation activities must meet badge and training requirements necessary to enter INEEL facilities. Project-specific training requirements for visitors are described in the project-specific HASP (INEEL 2003).

6.5 Project Cost Estimate

The total project costs are estimated to be $5.7 million. The project cost estimate is provided in Appendix B.

6.6 Project Schedule

The remedial action working schedule for Group 7 is presented in Appendix B and includes the project tasks from the RD/RA Work Plan through performance of the remedial action and submittal of the closure report. The schedule does not include any contingency for delays due to weather or other causes outside the control of the project team. Table 6-1 shows the targeted activities associated with the Group 7 VES-SFE-20 tank system removal project. The current schedule has the project being performed in two phases. Phase II will be coordinated with the Group 3 soils remediation, as appropriate.

Table 6-1. Summary of major Group 7 activities, future reports, and primary enforceable milestone.

Group 7 Activities	Target Date	Enforceable Milestone
Perform Prefinal Inspection for Phase I	2/23/06	NA[a]
Perform Prefinal Inspection for Phase II	11/24/09	NA
Submit Draft Remedial Action Report	2/29/12	Yes

a. NA = not applicable.

6.7 Inspections

The following sections describe the inspections planned for the VES-SFE-20 tank remediation and their associated documents. In addition to these inspections, the Agency project managers or their designees may, at their discretion, inspect the site during the construction phase of the remediation to assess compliance with the remedial design and the requirements outlined in this WP. These inspections may be conducted at any time during the project. Following completion of Phase I, a completion report will be prepared to document the completion of Phase I. This report will become input to the prefinal inspection report following Phase II.

6.7.1 Prefinal Inspection

Due to the multiphase remedial approach, a prefinal inspection will be conducted by the Agency program manager or representative at, or prior to, completion of the Phase I and also the Phase II remediation activities. The WAG manager will develop a Prefinal Inspection Checklist. A draft checklist is included in Appendix C, for use by the Agencies in conducting the inspection, which can be modified by the Agencies if necessary to address their needs. The checklist will focus on RA elements significant to meeting the ROD requirements. The checklist will identify specific activities, procedures, or other items agreed upon by all parties to be inspected that will constitute acceptance of the remediation activities. DOE-ID will notify the Agencies approximately 2 weeks prior to the prefinal inspection date. The date for final inspection is established following the Prefinal Inspection, and, if that inspection did not identify any outstanding items, the final inspection may be waived.

6.7.2 Prefinal Inspection Report

Following the inspection for each phase, the Prefinal Inspection Report will be prepared and submitted to the Agencies as a secondary document. Although DOE-ID will respond to comments received from EPA and IDEQ, the Prefinal Inspection Report will not be revised. Instead, the comments will be resolved in the context of the Remedial Action Report, a primary document, in accordance with Section 8.4 of the FFA/CO (DOE-ID 1991). The Prefinal Inspection Report will include

- Names of the inspection participants
- Completed inspection checklist identifying deficiencies and/or outstanding interim action requirements
- Discussion of findings
- Corrective action required to resolve deficiencies
- Schedule for completion of corrective actions
- Date of final inspection
- Operation and Maintenance Plan update.

All of the deficiencies and outstanding items, along with the actions required to resolve them, will be identified and approved by the Agencies during the prefinal inspection. The Prefinal Inspection Report will then document any unresolved items and the action(s) required to resolve them.

6.7.3 Final Inspection

The final inspection will be conducted following Phase II demobilization, when all soil in excess of the WAG 3 RAOs and excess materials and nonessential remediation equipment have been removed from the site. Some equipment may remain onsite to repair items observed during the final inspection. The final inspection, conducted by the Agency project managers, will confirm the resolution of all outstanding items identified in the prefinal inspection and verify that the VES-SFE-20 tank remediation has been completed in accordance with the requirements of the ROD (DOE-ID 1999).

6.8 Remedial Action Report

The Remedial Action Report for the VES-SFE-20 remediation will be prepared following Phase II demobilization and final inspection and submitted to the Agencies as a primary document. This report will include

- A synopsis of the remediation work defined in the RD/RA Work Plan and certification that this work was performed
- Explanation of any modifications to the RD/RA Work Plan, including the purpose for and the results of the modification
- Discussion of issues encountered during remediation and their resolution
- Brief description of outstanding items from the prefinal inspection, as documented in the Prefinal Inspection Report
- A statement certifying that the remedy is achieving, or has achieved, the requirements of the ROD (DOE-ID will provide)
- Discussion of the results of the final inspection
- As-built drawings showing final contours and configurations

- Final total costs of the RA.

6.9 Remedial Action Sampling and Analysis

Remedial action sampling and analysis will be performed under the protocols documented in the *Field Sampling and Analysis Plan for VES-SFE-20 Hot Waste Tank System* (DOE/ID 2003b), presented in Attachment 8. This Field Sampling Plan establishes procedures and requirements that will be used to perform field sampling activities, as well as minimizing health and safety risks to persons working at the VES-SFE-20 tank system site. It contains information about the sampling locations, methods for sample collection, analytical and QA/QC requirements, and laboratory methods. The purpose of this plan is to determine the nature and extent of soil contamination around the VES-SFE-20 tank system and characterize wastes to be removed from the site for disposal at the ICDF landfill. Wastes anticipated to be disposed of at the ICDF landfill includes soil and components of the tank system that meet the ICDF WAC.

6.10 Decontamination Plan

At the completion of each phase (Phase I and Phase II), equipment decontamination will be conducted in designated areas in each work zone. Specific decontamination procedures will be performed for radiological contaminants on equipment used during remedial activities. Decontamination operations will be performed under the direction of the RCT.

Dry decontamination procedures will be used at the beginning of the decontamination effort. If additional wet decontamination is necessary, the equipment will be driven or placed onto a decontamination pad and/or plastic, such as rubber matting, for this activity. If this is not successful, equipment may be decontaminated by using a high-pressure water spray from a portable unit. All equipment will be surveyed and visually inspected to ensure all source contamination has been removed. If additional contamination is still evident, additional decontamination efforts will be conducted until the equipment is free-releasable and clean. The equipment will remain in the areas where remediation is occurring until it is adequately decontaminated, as verified by field radiation surveys performed by the RCT.

The following equipment is required to conduct decontamination:

- Decontamination pads or plastic large enough for any equipment used in the contaminated areas

- Brooms, wire brushes, putty knives, and other small equipment for removing radionuclide-contamination through dry methods

- Portable low-volume, high-pressure water spray units (this equipment would only be used if dry decontamination was ineffective).

Waste generated from the decontamination activity will be managed per the project WMP (DOE-ID 2003c). Tools used for equipment decontamination (e.g., brushes) will be decontaminated, surveyed for radiological contamination, and released for reuse as appropriate. If decontamination is not possible, equipment will be either managed as waste, or moved to the SSSTF Contaminated Equipment Pad for reuse or eventual disposal.

6.11 Waste Management

Management of wastes generated from these remediation activities is addressed in the project WMP (DOE-ID 2003c) provided as an attached document to this RD/RA WP. The WMP provides identification of each of the waste streams, describes waste minimization actions, and provides requirements for waste transportation, waste storage, and ultimate disposal.

6.12 Health and Safety

The project HASP (INEEL 2003) identifies health and safety hazards and requirements used to eliminate and/or minimize the hazards during remedial actions including the removal, treatment (as necessary), and disposal of the VES-SFE-20 tank, sediment, vault, access way, pump pit, ancillary piping, CPP-642 building, and underlying contaminated soils per WAG 3 remedial action objectives. VES-SFE-20 is located next to CPP-603 inside the fence at the INTEC at the INEEL. The HASP has been written to meet the requirements of the 29 CFR 1910.120.

Safety, health, and radiological professionals assigned to support this project will utilize this health and safety plan as the basis for planning and hazard mitigation. Additional hazard controls and mitigation measures will be further defined based on project-specific conditions and changes to this plan and associated work control documents should be made as appropriate.

6.13 Other Procedures Relevant to RA Activities

Other procedures required for performance of the VES-SFE-20 tank system will be identified as needed and included in the appropriate project documentation.

7. FIVE-YEAR REVIEW

As specified by Section 12.6 of the OU 3-13 ROD, the entire area of INTEC covered by the ROD will be included in a single periodic 5-year review. If, at the time of the first OU 3-13 INTEC 5-year review, contaminants remain in Site CPP-69 above levels that allow for unlimited use and unrestricted exposure, the site will be included in the OU 3-13 INTEC 5-year review to assess the protectiveness of existing controls. If, following remediation of Site CPP-69, contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure, the action will be reviewed no less often than every 5 years as part of the OU 3-13 INTEC 5-year review. Five-year reviews will be conducted by DOE for remediated sites with institutional controls at least until 2095 (i.e., until the 100-year institutional control period expires) or until it is determined during a 5-year review that institutional controls and 5-year reviews are no longer necessary. The Agencies may also determine that, in the case of a remedy that is no longer meeting performance standards, modifications to the remedy are required.

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